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WAR DEPARTMENT TECHNICAL MANUAL



SHOE REPAIR MACHINES

(LANDIS AND AMERICAN)

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FOREWORD

The instructions in this manual are published for the information and guidance of the personnel to whom the shoe repair equipment is assigned. They contain information on the operation, maintenance, and repair of the stitching, finishing, combination sole cutter and skiver, and patching machines, and on the shoe repair trailer itself. Each major unit of equipment is described and its function in relation to the other components is explained.

The manual is divided into five books which cover the following equipment:

Book 1—STITCHING MACHINE (American Models B, C, and CA, and Landis No. 12 Models F and K).

Book 2—FINISHING MACHINE (American Model L, and Landis 100 Line Model 102).

Book 3—SOLE CUTTER AND SKIVER MACHINE (American Model B, and Landis).

Book 4—PATCHING MACHINE (Singer Models 29K58, 29K60, 29K62, and 29K70).

Book 5—TRAILER, TWO-WHEEL, SHOE REPAIR.

The instructions in each of the five books are arranged in five parts as follows:

Part One, Introduction.

Part Two, Operating Instructions.

Part Three, Maintenance Instructions.

Part Four, Auxiliary Equipment.

Part Five, Repair Instructions.

Information on the storage and shipment of the equipment, and pertinent references, such as applicable supply catalogs, Technical Manuals, manufacturer's manuals, and Film Strips, will be found in the appendices.

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BOOK 1
STITCHING MACHINE

Landis No. 12 models F and K
American models B, C, and CA

PART ONE INTRODUCTION

Section I. GENERAL

1. Scope

The instructions in book 1 apply to the Stitching Machine, Landis No. 12 Models F and K and American Models B, C, and CA. Each of the five models is a curved needle and awl sole stitcher designed to sew the outsole to welted soles.

a. Part two contains information on the operation of the stitching machine and a description of its controls and instruments.

b. Part three contains information for the guidance of the personnel of using organizations responsible for the first and second echelon maintenance of the stitching machine. It contains information needed for the scheduled lubrication and preventive maintenance service. Paragraphs 52 through 71 are devoted to second echelon maintenance for the various assemblies and major units which comprise the Landis No. 12 Model K Stitcher. They contain short descriptions of the components as well as explanations of the purpose, functioning, and interrelationship of systems in the equipment. These sections contain description, removal, adjustment, and installation of unit. Only the maintenance which the unit mechanic of the using organization is authorized to perform is included.

c. Part five contains instructions for the information and guidance of personnel responsible for third and higher echelon maintenance of the stitching machine. It contains maintenance information which is beyond the scope of the tools, equipment, and supplies normally available to using organizations. Details of motor maintenance are given in TM 9-1825A.

2. Requisitioning Information

Tools, spare parts, and supplies should always be requisitioned by Federal stock number and standard nomenclature when these are indicated. If no Federal stock number is shown, requisition is by vendor's part number and nomenclature. When ordering spare parts, give the serial number of the machine in addition to the vendor's part number

and nomenclature.

3. Records

a. WD AGO FORM 460 (PREVENTIVE MAINTENANCE ROSTER). The parts of this form which apply to stitching machines may be maintained to record the lubrication of this equipment, as described in paragraphs 44 and 45.

b. WD AGO FORM 468 (UNSATISFACTORY EQUIPMENT REPORT). This form will be used to report defects in the manufacturing, design, or operation of machines, assemblies, or parts. The same form will be used to report complaints on the lubricants and preserving materials used in the machines. When so used, the form will contain identifying details of the products and machinery on which they are used.

4. Orientation

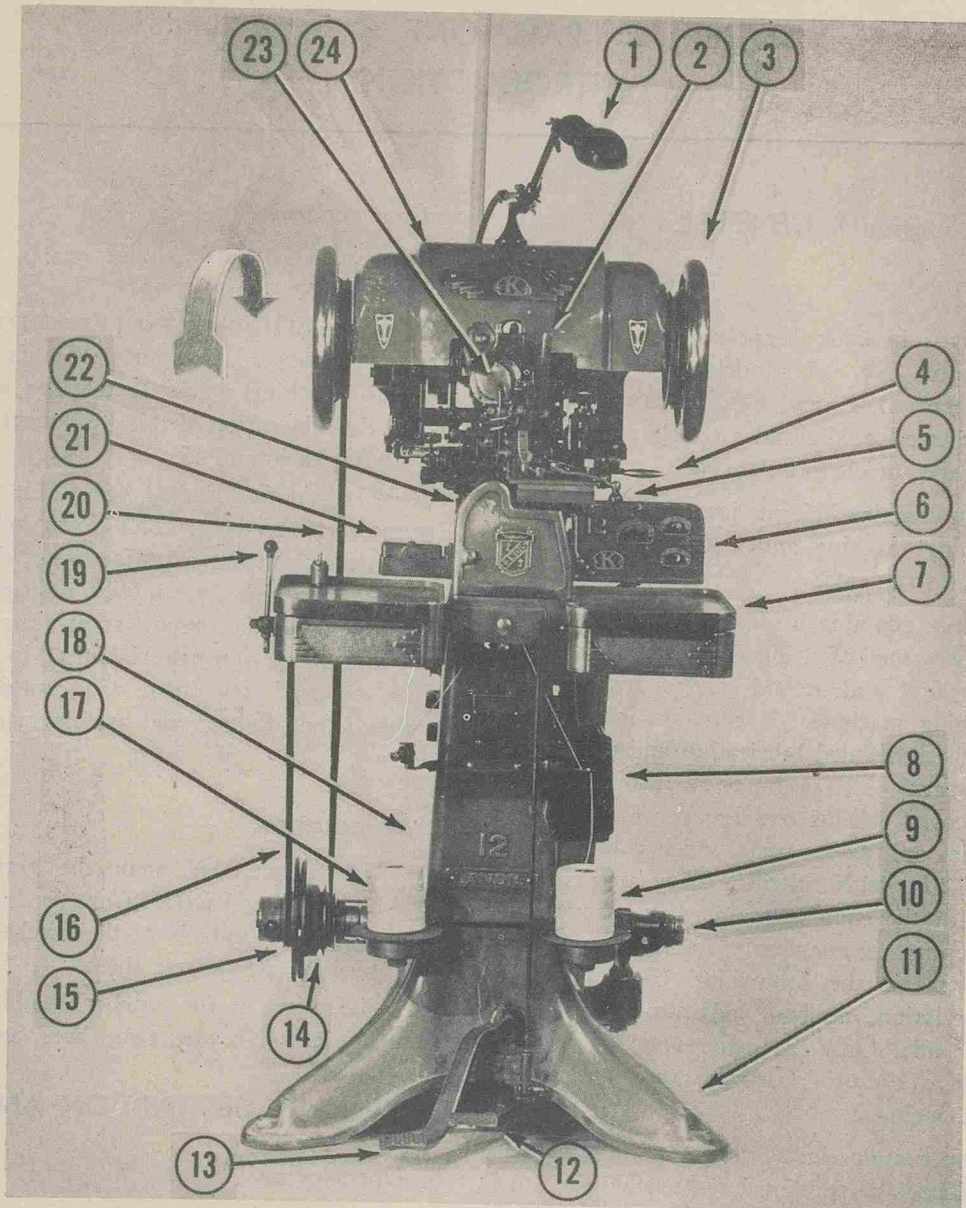
a. Throughout this book the terms FRONT, REAR, LEFT and RIGHT are used as the operator standing at the controls of the stitcher in the operating position would use them.

b. The cams in the stitcher head are numbered from the left: No. one, two, three, and four.

Section II. DESCRIPTION AND DATA

5. Description

a. GENERAL. The five models included in this book are fundamentally alike. Any one of them may be found in the van type shoe repair trailers or in fixed repair installations. However, the Landis No. 12 model K (fig. 1) is the model most commonly used. This model is standard in filling the stitcher requirements of the Army. This machine is also in the Landis portable shoe repair unit (fig. 4) which is installed in the two-wheel shoe repair trailer. For that reason, the text of this book is based on the Landis No. 12 model K Stitcher. Specific reference to the maintenance and operation of the other four models of stitchers will be made only when applicable instructions differ from those prescribed for the model K Stitcher.



Ref. No.	Nomenclature	Ref. No.	Nomenclature
1	Lamp.	13	Power treadle.
2	Presserfoot lever.	14	Power belt wheel.
3	Handwheel.	15	Power friction wheel.
4	Feed and guide handle.	16	Bobbin winder belt.
5	Shoe guide shifter handle.	17	Bobbin thread.
6	Control panel.	18	Stand column.
7	Tool shelf.	19	Bobbin winder shifter handle.
8	Motor control.	20	Power drive belt.
9	Needle thread.	21	Bobbin oven.
10	Power shaft.	22	Heat guard.
11	Standard base.	23	Shuttle.
12	Presserfoot treadle.	24	Cam cover.

Figure 1. Landis No. 12 model K sole stitcher.

b. IDENTIFICATION. The operator should be able to identify his machine completely. The name and model letter of the American models B, C, and CA appear on the front of the stitcher head cover. The serial number of the machine is shown on the metal plate at the top of the control panel. (See fig. 3.) The name and the model number and letter of the Landis machines is found on the stitcher head cover and on the control panel. The serial number appears on the metal plate fastened on the base of the stitcher head directly beneath cam No. two. Accurate identification of the machine is especially important in ordering replacement parts.

c. DIFFERENCES IN MODELS. The five models are basically alike, but they are different to the extent that the models developed most recently contain some improvements not found on the others.

(1) *Landis model F.* This model (fig. 2) was

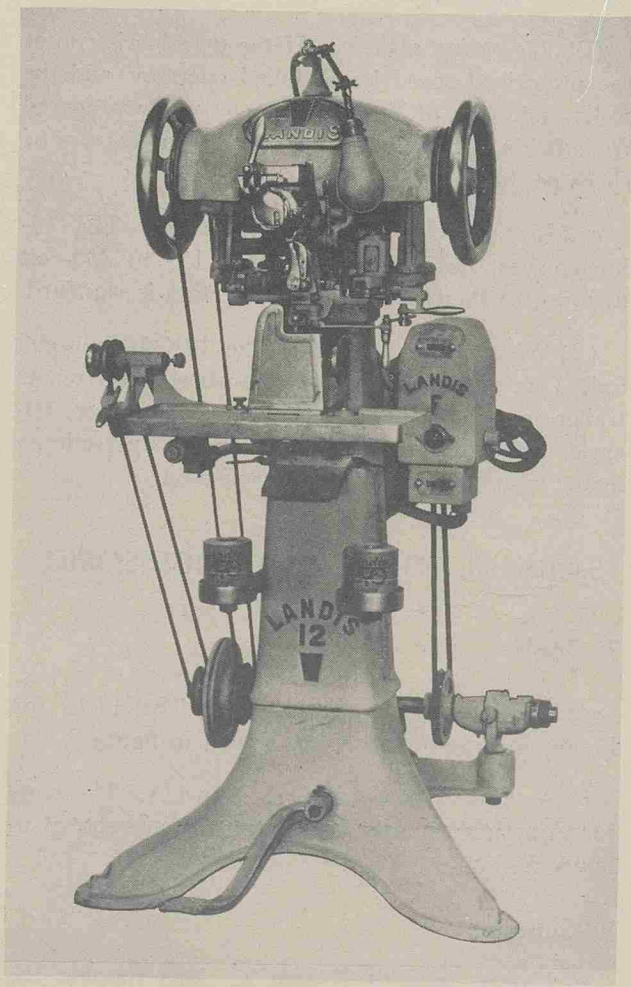


Figure 2. Landis No. 12 model F sole stitcher.

the first of the two Landis models to be used by the Army. The presserfoot lift is hand-operated and the presserfoot has a ratchet lock. It has no manual release on the thread lock. The first model F stitchers have a rheostat temperature control for the use of hard wax, but later models of this stitcher have the same thermostatic heat control as that used on the Landis model K.

(2) *Landis model K.* On the model K (fig. 1) the presserfoot can be released and raised with a foot-operated control. This operation simultaneously releases the thread lock. The lock on the presserfoot of the model K is a multi-thread screw and nut. Operating temperature of the wax- and thread-handling mechanisms is automatically controlled by a White-Rogers hydraulic diaphragm switch thermostat. The K has a front thread lock and carries a heavy tension. When the thread must be pulled manually, both lock and tension can be released by operating the foot control. The heating elements on models K and F are alike, but are different from the heating elements on the American models. Models K and F have four flat, conduction type heat units which total 260 watts. One is clamped to the shuttle head, one to the wax pot (heat plate), one to the take-up (heat plate), and one to the bobbin winder.

(3) *American model B.* The model B (fig. 3) is one of the earlier American models. The presserfoot lift is hand-operated and the presserfoot has a ratchet lock. The thread lock does not have a manual release. Operating heat temperature is controlled by a rheostat. Later models of the model B stitcher have the same thermostatic heat control used on the American models C and CA. The heating elements used on this stitcher are the same as those used on models C and CA. The stitcher has four heating elements, each $\frac{1}{2}$ inch in diameter, supplying a total heating capacity of 300 watts. The heating units are inserted in $\frac{1}{2}$ -inch holes in the machine parts that are to be heated. One is placed in the shuttle head and the other three go into the heat plate.

(4) *American models C and CA.* In these models the operating heat is controlled by a Minneapolis-Honeywell mercury tube and bimetal coil thermostat. The presserfoot is released and raised with a foot-operated control. Operation of that control simultaneously releases the thread lock. The presserfoot has a ratchet lock. The model C has a double thread lock with two thread lock rolls and a thread meas-

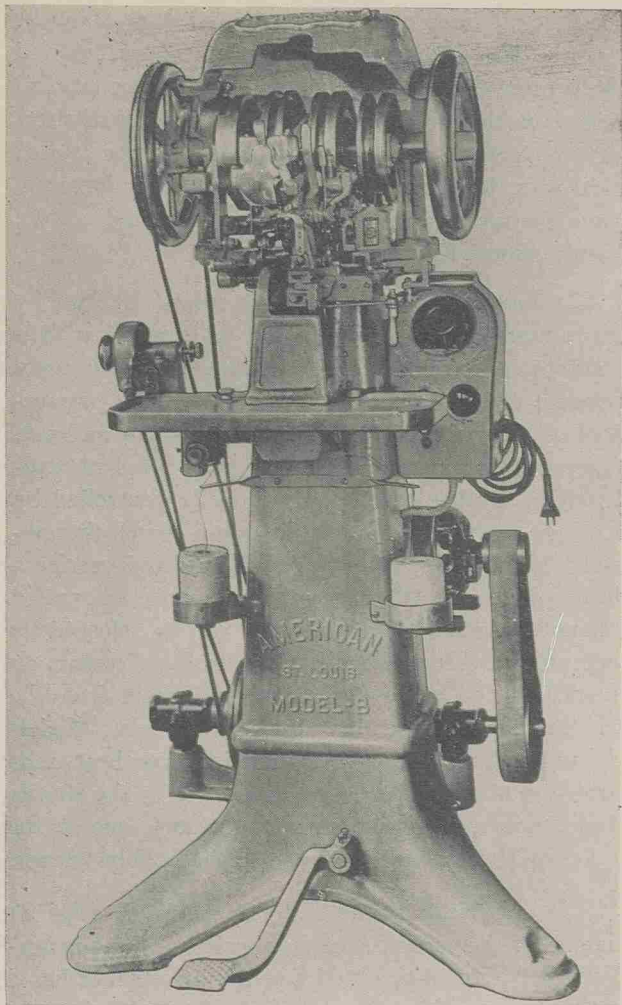


Figure 3. American model B sole stitcher. (Cam cover has been lifted to show operating mechanism of the stitcher head.) American models C and CA (not shown) are similar to this model in appearance.

urer operating between the action of the rolls. The thread lock rolls alternately open and close automatically as the thread is measured and the lock is pulled in. In the model CA, that design has been changed to one thread lock roll and a tension lock. The tension lock is set with a moderate tension that yields readily to pulling of the thread. It is locked only when the front thread lock is open and is designed to prevent the take-up from stealing thread when the thread is pulled out of the shuttle. When the thread is pulled out of the shuttle, the front lock is open in order to absorb the thread measured out for the stitch.

6. Tabulated Data

a. SHIPPING DATA. The shipping data listed

below for the Landis models F and K are not given for the American models B, C, and CA, which are no longer in production. The specifications are for the machines when boxed.

Landis model	Dimension (in.)			Weight (lbs.)		
	Length	Width	Height	Gross	Tare	Net
F....	36	36	64	1,050	490	560
K....	36	36	64	1,110	510	600

b. PERFORMANCE. (1) *Operating speed.* The countershaft of these stitchers should be run at a speed of about 600 revolutions per minute. At that speed the camshaft in the head of the stitcher will operate at the prescribed speed of 250 to 300 revolutions per minute.

(2) *Operating capacity.* If the machine is run at the prescribed speed by a skilled operator, and the welts and soles of the shoes are properly prepared for stitching, the stitcher will sew 30 to 40 pairs of shoes per hour.

c. MOTOR. (1) *Single-unit stitcher.* The $\frac{1}{2}$ -horsepower, single-phase, 60-cycle, 115 to 230-volt motor with thermal overload protection is standard.

(2) *Stitcher-finisher unit.* The 12K-100 special unit (fig. 4) used on the two-wheel shoe repair trailer contains a $1\frac{1}{2}$ -horsepower, single-phase, 60-cycle, 110 to 220-volt, 1,750-revolutions-per-minute motor with thermal overload protection.

Section III. TOOLS AND ACCESSORIES

7. Tools

a. LANDIS MODELS F AND K. The tools for Landis models F and K are shown in figure 5.

b. AMERICAN MODELS B, C, AND CA. The tools for American models B, C, and CA are shown in figure 6.

8. Supplies

a. LANDIS MODELS F AND K. The supplies for Landis models F and K are listed on page 7.

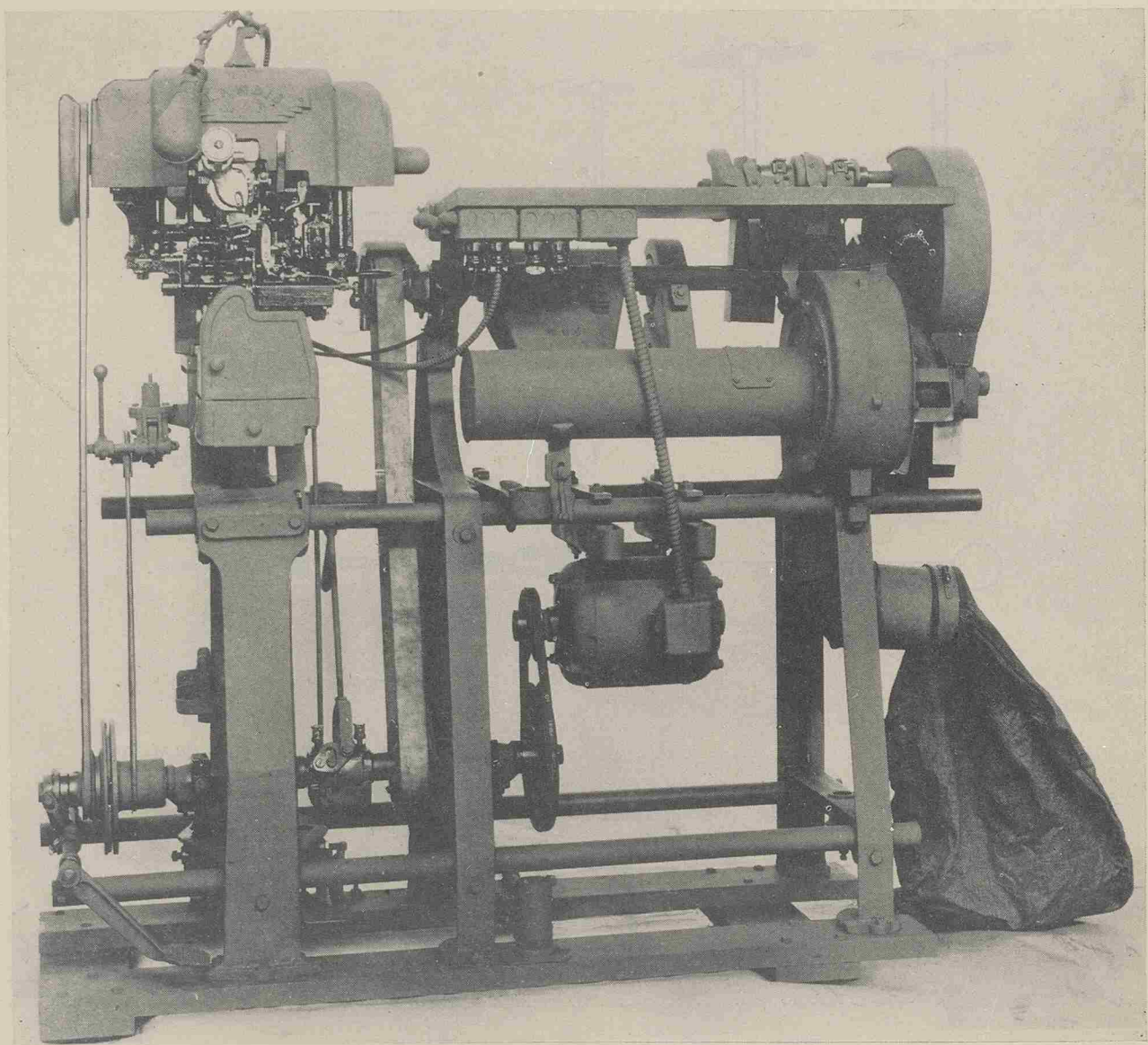
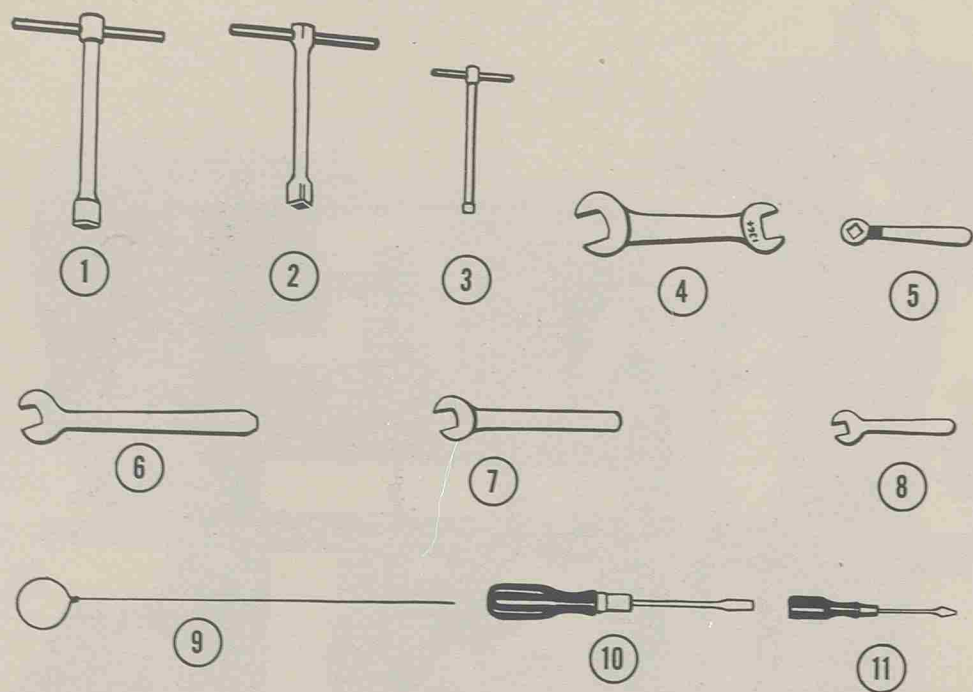
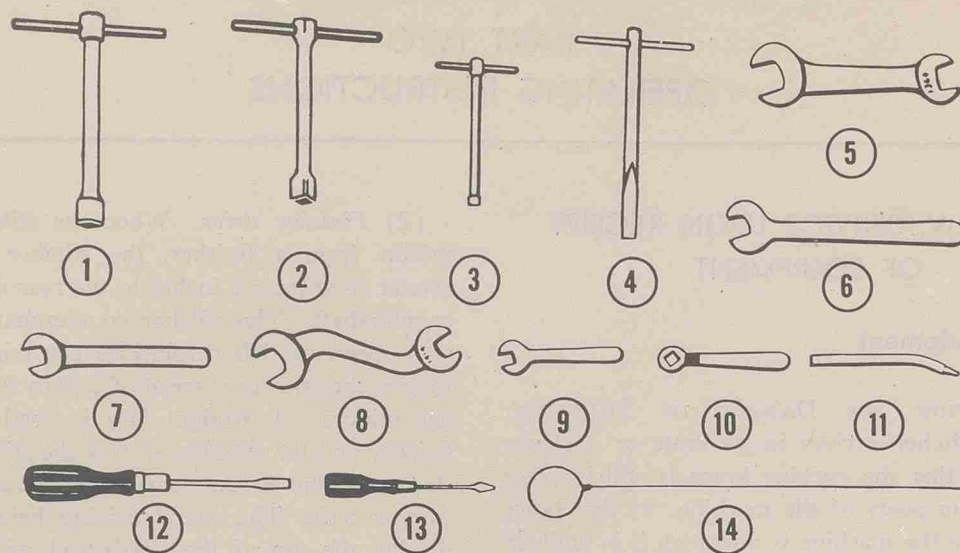


Figure 4. Landis portable shoe repair unit model 12 K-100 special. (Landis No. 12 model K stitcher appears at the left of the unit.)



Ref. No.	Vendor's part No.	Nomenclature
1	W-1	 Socket wrench for needle and awl clamp 12-24-303AW.
2	W-2	 Socket wrench for needle guide screw 12-24-307W.
3	W-7	 Socket wrench for looper binding screw 12-29-305W.
4	W-5	 Double-end wrench.
5	W-22	 Stripper adjusting wrench 12-31-624C.
6	W-18	 Wrench for 36-6-307W.
7	W-4	 Single-end wrench 12-24-301W.
8		 Wrench for needle segment stud setscrew 24-302B.
9	31-913H	 Threading wire.
10		 Large screw driver.
11		 Medium screw driver.

Figure 5. Tools furnished with Landis models F and K.



Ref. No.	Vendor's part No.	Nomenclature
1	B-14-1.....	3/8-inch square socket wrench.
2	B-14-2.....	5/16-inch square socket wrench.
3	B-14-3.....	9/64-inch square socket wrench.
4	B-14-11.....	T-handle screw driver.
5	B-14-4.....	5/8-inch and 3/4-inch double-end wrench.
6	B-14-5.....	9/16-inch single-end wrench.
7	B-14-6.....	1/2-inch single-end wrench.
8	B-14-7.....	1/2-inch and 11/16-inch S wrench.
9	B-14-8.....	5/16-inch open-end wrench.
10	B-14-9.....	5/16-inch box wrench.
11	B-14-10.....	Pin wrench.
12	B-14-12.....	3-inch screw driver.
13	B-14-13.....	Bobbin case screw driver.
14	B-14-14.....	Threading hook.

Figure 6. Tools furnished with American models B, C, and CA.

Supply list

Vendor's part No.	Name	No. furnished
.....	No. 22 needles.....	12
.....	No. 22 awls.....	12
.....	No. 23 awls.....	12
K25-6.....	Bobbins.....	2
24-308.....	Needle plate screw.....	1
24-307.....	Needle guide screws.....	2
31-908E.....	Rubber strippers.....	2
23-209.....	Cam cover studs.....	2
23-905B.....	Round belt hooks.....	3
.....	Lag screws.....	3
12G 31-43...	Electric lamp.....	1
12G 31-54B.	Lamp shade.....	1
.....	Stitcher oil.....	¹ 1
.....	White wax.....	² 1

¹ Quart.

² Pound.

(Additional operating supplies issued to the organization may be found in par. 42.)

b. AMERICAN MODELS B, C, AND CA. The supplies for American models B, C, and CA are listed below:

Supply list

Vendor's part No.	Name	No. furnished
.....	No. 50 needles.....	12
.....	No. 47 awls.....	12
B-3-8...	Bobbin.....	1
B-4-7C..	No. 50 needle guide.....	1
B-4-7G..	Needle guide fastening screw.....	2
B-6-6...	Long lip presserfoot.....	1
B-6-3E..	Presserfoot fastening screw.....	1
B-4-8B..	Work table screw.....	1
B-11-2D	Shoe guard.....	1
B-13-7..	50-watt lamp (for 110-volt machine)	1
B-13-8..	50-watt lamp (for 220-volt machine).	1
.....	Machine oil.....	¹ 1
.....	Wax.....	² 1

¹ Quart.

² Pound.

PART TWO

OPERATING INSTRUCTIONS

Section IV. SERVICE UPON RECEIPT OF EQUIPMENT

9. New Equipment

a. INSPECTION FOR DAMAGE IN SHIPMENT. When the stitcher arrives in its crate or package, check to see that the packing brace is still in place across the cam posts of the machine. If that brace is intact when the machine is uncrated, it is unlikely that any part of the stitcher has been damaged in shipment. If the supporting brace is loose and the stitcher has moved in the crate, check the exposed parts at the front of the head and the countershaft mounting at the rear of the base of the machine.

b. REMOVAL OF CORROSION-PREVENTIVE MATERIAL. The machined parts of the stitcher not protected by a coat of paint are covered with a slushing grease when the machine is shipped. Remove the protective coating of grease and clean the operating parts of the machine thoroughly. The cleaning of the cams and cam races should be given special attention, because their wearing surfaces are easily damaged by the scouring action of dirt and grit. A mixture of Diesel fuel and machine oil makes a good flushing solution to use in the initial cleaning of the stitcher. The solution should not contain more than 15 percent machine oil.

c. INSTALLATION. (1) *Motor drive.* When a stitcher is equipped with motor, its installation is independent of the location of the finisher. The stitcher should be set up in a position that fits well into the normal flow of work from the jacks. It should be anchored to the floor if possible. When using a 2-inch power belt, a 3-inch pulley should be used on the motor, and an 8-inch pulley should be used on the countershaft. V-belt operation requires a 3½-inch motor pulley and a 9-inch countershaft pulley. When the belts are in place, see that the voltage of the stitcher motor and heating elements corresponds to the voltage of the power line to be used.

(2) *Finisher drive.* When the stitcher is to be driven from a finisher, the stitcher countershaft should be at least 6 inches to the rear of the finisher countershaft. The stitcher countershaft should run at a speed of 600 revolutions per minute in order to give the stitcher a speed of 250 to 300 revolutions per minute. A straight belt is used between the finisher and the stitcher, so that the stitcher countershaft will run in the same direction as the finisher countershaft. The round driving belts are crossed so that the top of the handwheel will turn to the rear.

(3) *Landis 12K-100 special unit.* A stitcher and a finisher are combined in this unit and are mounted on a common base. The unit is used in the two-wheel shoe repair trailer. Installation is complete when the unit is unloaded and placed on level ground or flooring and the power lead is plugged into a duplex outlet in the power line. (See fig. 4.)

d. RUN-IN TEST. After the machine is installed, turn the handwheel slowly. It should turn smoothly without binding in the camshaft bearings or the cam races. As the wheel turns, check the position of the awl and needle and check to see that the relative positions of the needle, looper, lifter, and presser-foot are correct. If the machine appears to run smoothly during this slow operation, oil the machine, plug in the electric cord, and turn the motor switch on. Block the power treadle down and run the machine for about 4 hours. The machine should not be left running unless an operator is present to stop it at the first sign of mechanical failure. After the run-in test, check the machine again. Make any adjustments that are necessary, as described in paragraphs 56 through 67.

10. Used Equipment

The original service upon the receipt of new equipment also applies to the receipt of used equipment. In addition, check the cam races and camshaft bearings for signs of excessive wear.

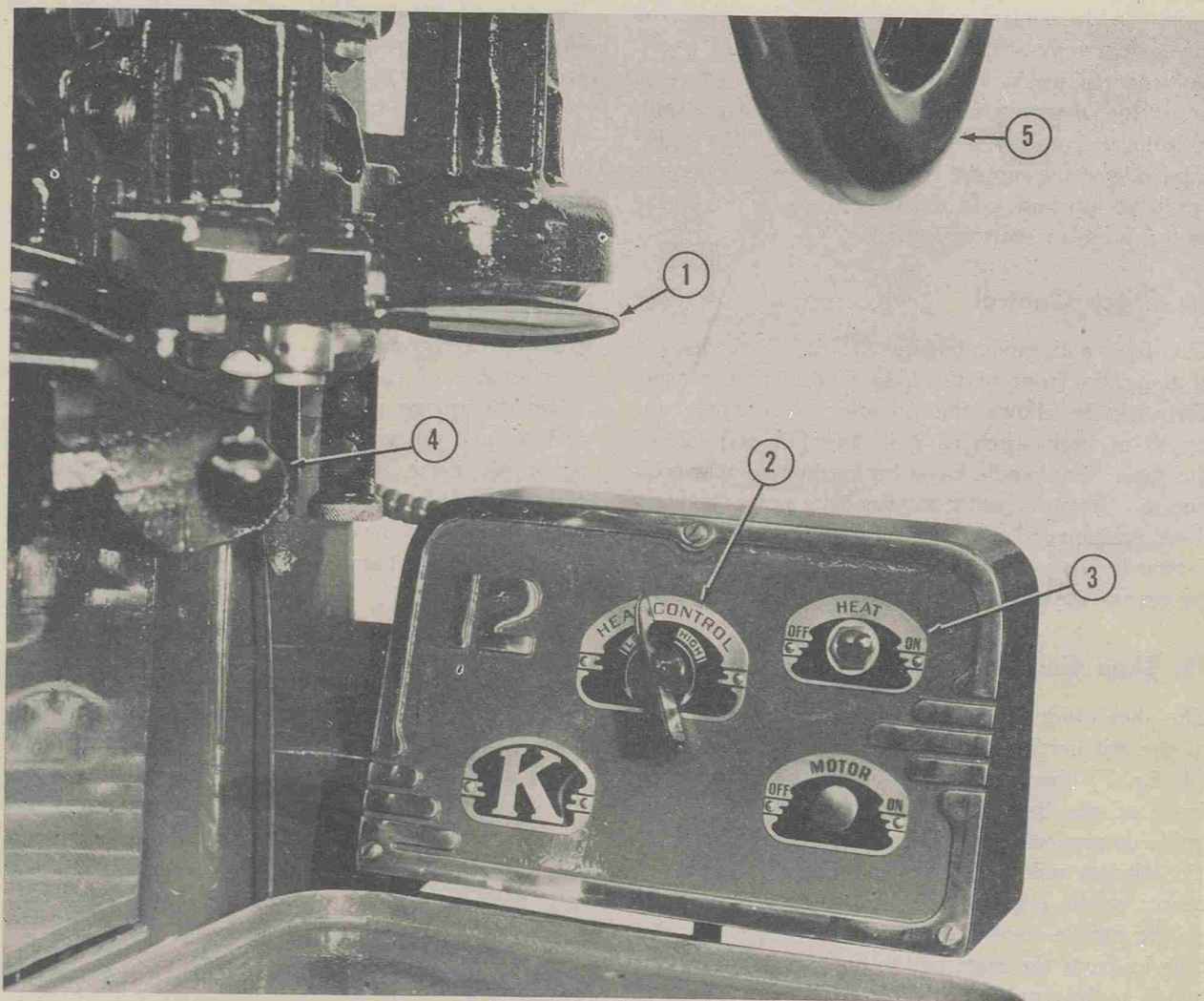
Section V. CONTROLS AND INSTRUMENTS

11. Heat Switch

The heat switch (3, fig. 7) is mounted on the upper right-hand corner of the control panel. The ON and OFF positions are marked plainly on the switch plate. Flip the toggle switch to the right to turn the heat on and flip the switch to the left to turn the heat off.

12. Heat Control

The heat control (2, fig. 7) is located on the top center of the control panel. When the heat has been turned on, the heat control allows the operator to regulate, between HIGH and LOW positions, the amount of current that goes into the heating elements of the machine. HIGH and LOW are plainly indicated on the heat control plate. Turn the indicator to the left as far as it will go to set the heat control at LOW. The LOW position is used to hold the temperature up during brief pauses in



Ref. No.	Nomenclature
1	Feed and guide handle.
2	Heat control.
3	Heat switch.
4	Shoe guide shifter handle.
5	Handwheel.

Figure 7. Controls (Landis model K).

operation. When more heat is desired, turn the indicator to the right until the proper amount of heat is being delivered to the machine. To get the greatest amount of heat that the heating elements can deliver, turn the indicator to the right as far as it will go, to the HIGH position. The HIGH position is used to warm up the machine before operation begins, and it may be used during operation in cold operating conditions.

13. Motor Control

The motor control switch (8, fig. 1) is no longer found on the control panel even though a plate for the switch may still be seen on the control panel. In order to use a switch with a thermal overload protection, the switch is mounted as a separate unit. It is located underneath the tool tray on the right-hand side of the support column. To start the motor, press the top button in the switch box. To stop the motor, press the bottom button.

14. Stitch Control

The feed and guide handle (1, fig. 7) is located at the right front of the base of the stitcher head. This handle allows the operator to regulate the length of each stitch as it is sewed in the sole of the shoe. The handle has a forward and a rear position, but it can be set at intermediate points between those positions. To lengthen the stitch, pull the lever forward. To shorten the stitch, push the lever to the rear of the machine.

15. Shoe Guide

The shoe guide is located in the center of the face of the stitcher head. The shoe guide shifter handle (4, fig. 7) that regulates it is located at the right front of the base of the stitcher head. The shoe guide determines how far from the edge of the sole the stitches will be made. To bring the stitching nearer to the edge of the sole, pull the shoe guide shifter handle forward. To move the stitching farther in from the edge of the sole, push the shifter handle to the rear of the machine.

16. Presserfoot Treadle

The presserfoot treadle (12, fig. 1) is located at the right front of the base of the stand. The presserfoot is located above the work table in the center of the face of the stitcher head. It holds the welt

and the sole down on the work table during the stitching operation. When the operator steps on the presserfoot treadle, he raises the presserfoot and releases the thread lock and the thread tension. Removing the pressure from the presserfoot treadle lowers the presserfoot and reestablishes the tension and the lock on the thread.

17. Power Treadle

The power treadle is located at the left front of the base of the stand. (See 13, fig. 1.) Stepping on the treadle engages the clutch on the power shaft at the rear of the machine, activating the power belt wheel and setting the stitcher head in motion. Increasing the pressure on the treadle increases the speed of the stitcher until the treadle is at its bottom position and the stitcher is running at top speed. Releasing the treadle disengages the clutch and causes the stitcher to come to a stop.

18. Presserfoot Lever

The presserfoot lever (2, fig. 1) is the hand control for the presserfoot. It is located in the center of the face of the stitcher head. It may be used when the spring in the presserfoot treadle linkage fails to pull the presserfoot completely down on the work when the treadle is released. To raise the presserfoot, push the presserfoot lever up and to the rear of the machine. To lower the presserfoot, pull the lever forward and down.

19. Bobbin Winder Shifter Handle

The bobbin winder is located at the rear of the left-hand tool shelf. The bobbin winder shifter handle (19, fig. 1) starts and stops the bobbin winder. To start the bobbin winder, pull the shifter handle forward. To stop the bobbin winder, push the handle toward the rear of the machine.

20. Handwheel

The handwheel at the right side of the stitcher head is used as the control handwheel. (See 3, fig. 1.) To start the machine, grasp the top of the handwheel with the right hand and push it backward and down. Step on the power treadle and the clutch will engage, and the stitcher will be set in motion. To stop the stitcher with the sewing parts in the desired position, release the power treadle and grasp the handwheel. The handwheel is also used, when

the clutch is not engaged, to turn the camshaft slowly to get a certain desired alignment of the parts of the stitcher head.

Section VI. OPERATION UNDER USUAL CONDITIONS

21. Threading Machine with Needle Thread (fig. 8.)

a. Place a spool of thread on the needle thread holder. This thread holder is located on the right side of the front of the column. (See 1, fig. 8.)

b. Pass the thread up through the hole in the thread guide. The thread guide (2) is located above and to the right of the stitching spool.

c. Loop the thread over a needle to use the needle as a thread guide. Pass the thread through the hole on the right side of the back of the wax pot (3).

d. Remove the top of the wax pot.

e. Pass the thread down through the right hole in the wax fork (4) so that the thread will come up between the forks.

f. Then pass the thread through the wax stripper (5) that is on top of the wax pot. If the wax stripper is new and tight, it must be disassembled (fig. 9) before the thread can be passed through it. Ordinarily, the threading wire and thread will pass through it without disassembly. If disassembled, pass the threading wire and thread through the rubber stripper, the metal wax pot stripper stud, and the wax pot stripper binding screw, in that order.

g. Reassemble the stripper. Make sure the wax forks are facing down in the wax pot, then fasten the wax pot top to the wax pot. Pull the thread out above the wax pot about 1 foot.

h. Place the thread on the tension wheel. (See 6, fig. 8.) Step on the presserfoot treadle to release the tension wheel. Turn the tension wheel up and away until the thread has made one complete turn around the wheel.

i. Pass the thread up the right side of the thread lock lever (7).

j. Around the thread-measuring roller (8).

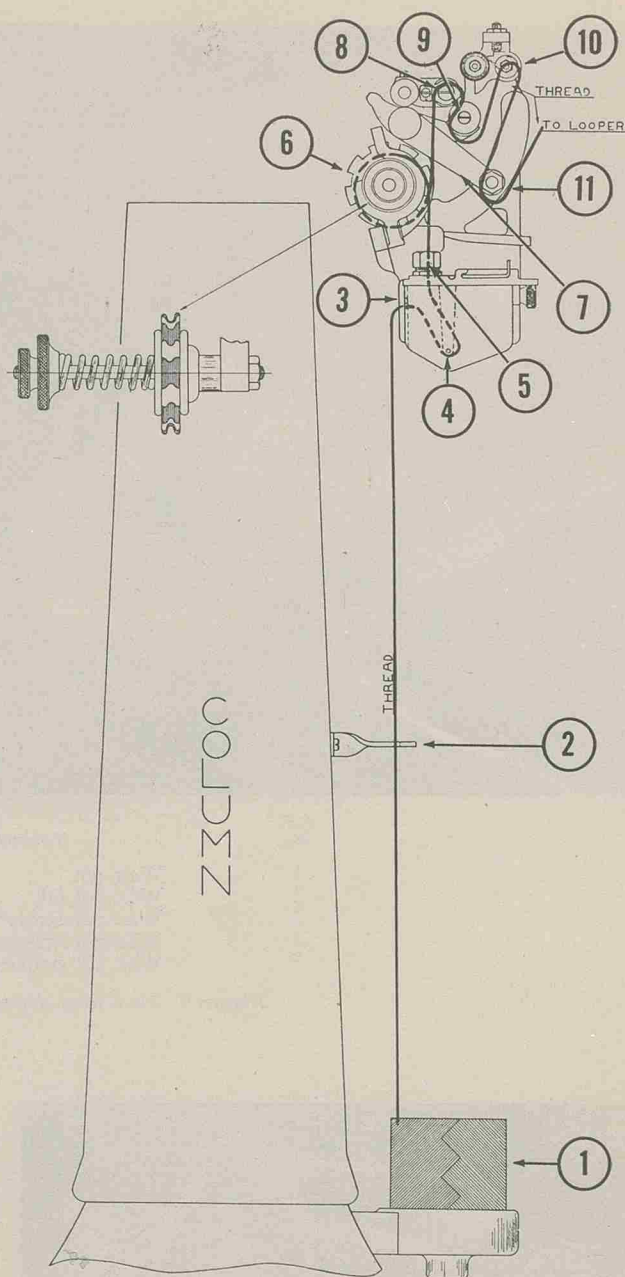
k. Down and under the thread lock roller (9).

l. Up and over the auxiliary take-up roller (10).

m. Down to the take-up lever roller (11).

n. Through the eye of the thread looper. (See 1, fig. 10.)

o. And through the plate. (See 2, fig. 10.)

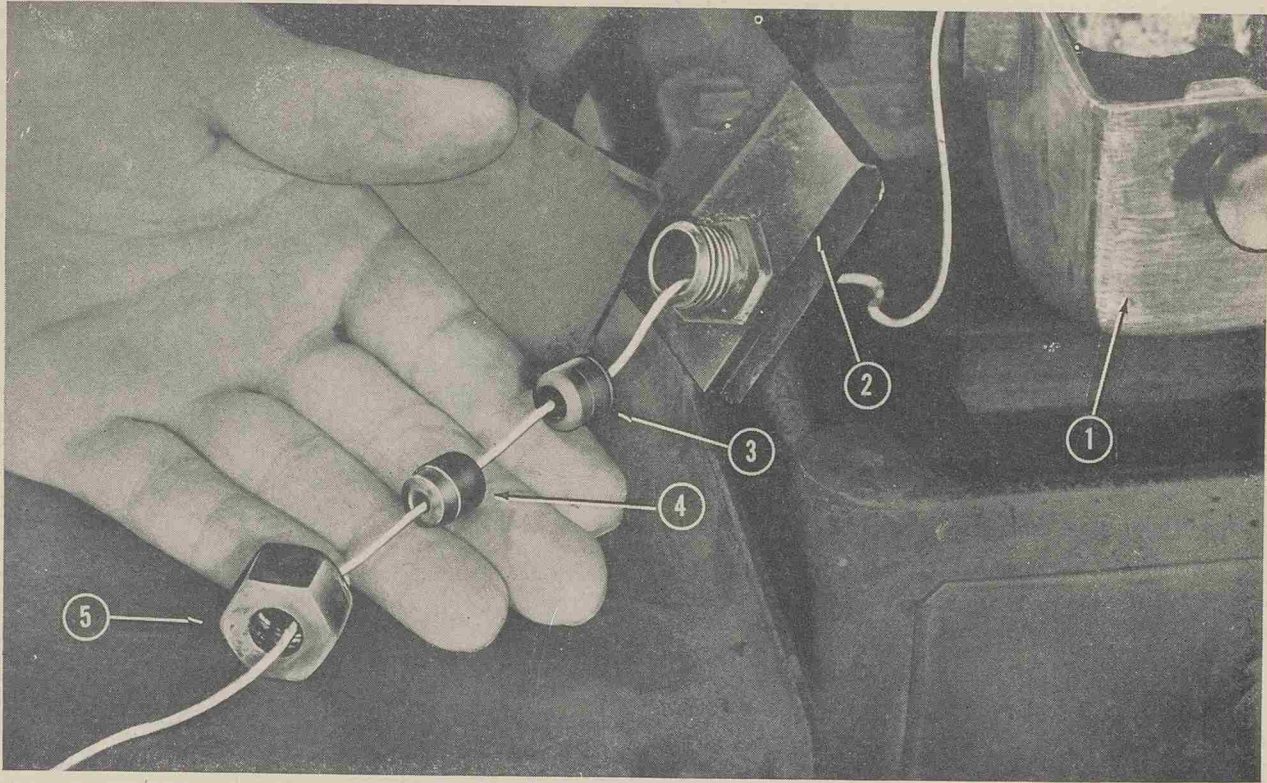


Ref.
No.

Nomenclature

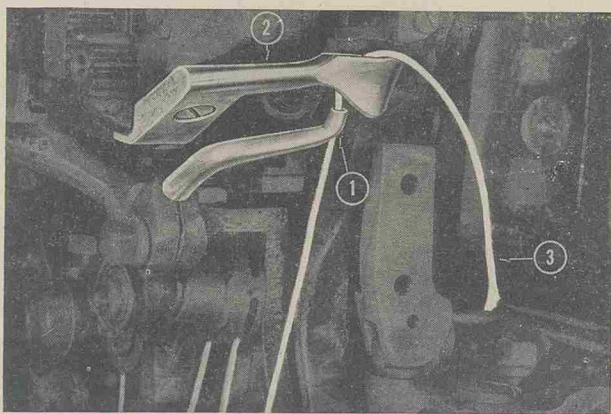
1	Needle thread.
2	Needle thread guide.
3	Thread hole in wax spot.
4	Thread fork.
5	Wax stripper.
6	Tension wheel.
7	Thread lock lever.
8	Thread-measuring roller.
9	Thread lock roller.
10	Auxiliary take-up roller.
11	Take-up lever roller.

Figure 8. Threading diagram for needle thread.



Ref. No.	Nomenclature
1	Wax pot.
2	Wax pot lid.
3	Wax pot stripper bushing.
4	Wax pot stripper stud.
5	Wax pot stripper binding nut.

Figure 9. Threading disassembled wax pot stripper.



Ref. No.	Nomenclature
1	Eye of looper.
2	Needle plate.
3	Needle thread.

Figure 10. Threading looper and needle plate.

22. Threading Machine with Bobbin Thread (fig. 11.)

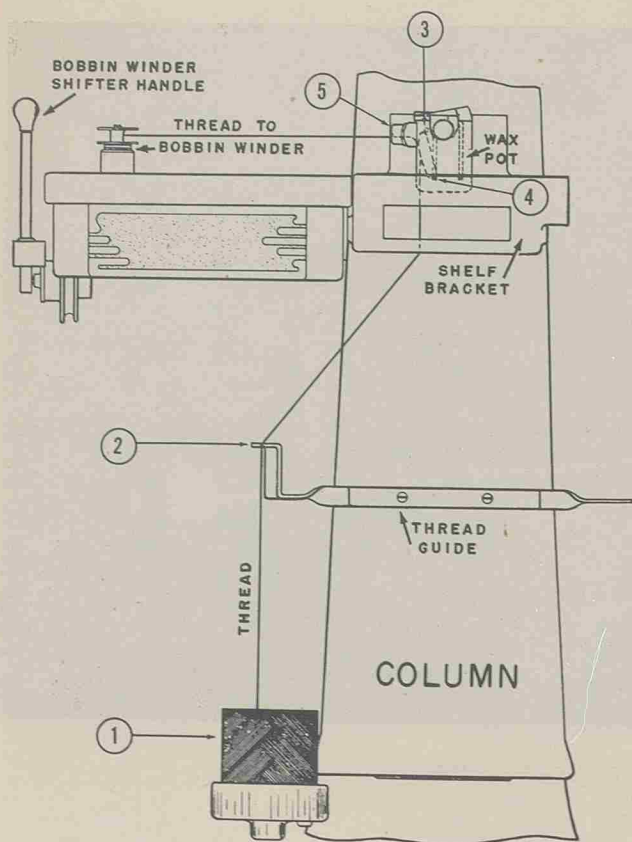
a. Place a spool of thread on the bobbin thread holder. This thread holder is located on the left side of the front of the column. (See 1, fig. 11.)

b. Pass the end of the thread between tension disks and through the hole in the thread guide (2), which is located directly above the bobbin winder spool.

c. Through the hole in the left side of the back of the wax pot (3).

d. And down through the inside of the left thread fork. (See 1, fig. 12.)

e. Loosen the stripper binding screw and pass the thread through the stripper. (See 2, fig. 12.) (When wax is put into the wax pot, the binding screw must be tightened enough to strip excess wax from the thread. See par. 59.)



Ref. No.	Nomenclature
1	Bobbin thread.
2	Bobbin thread guide.
3	Thread hole in wax pot.
4	Thread fork.
5	Wax stripper.

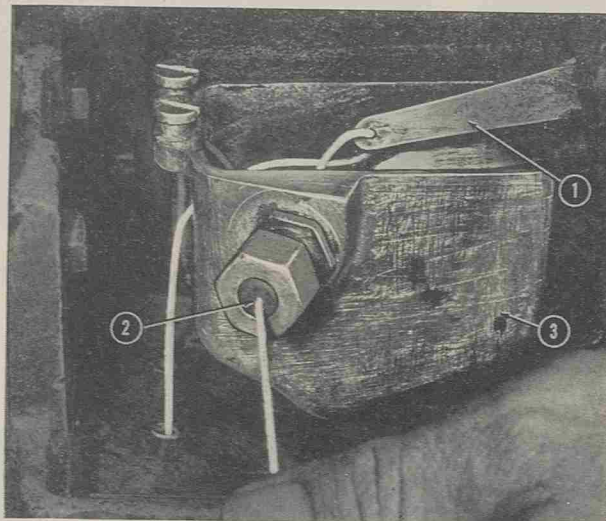
Figure 11. Bobbin thread threading diagram.

23. Wax

Hard wax is used in the wax pot. (See 1, fig. 9.) Break the wax in small pieces to put it into the wax pot. Do not fill the wax pot with wax. It is easier to control the condition of the wax when the pot is kept half full and fresh wax is added when it is needed. Leave enough wax in the bottom of the pot to melt new wax when it is added. Wax that boils or is heated for any length of time turns black and becomes brittle. Wax in this condition hardens quickly. The waxed thread then becomes stiff and will not lie in the barb of the needle properly and frequently breaks when it is pulling in the bobbin thread.

24. Heating Machine

a. GENERAL. Heating the machine is one of the most important factors in the successful operation of the stitcher. Heated to the right temperature, wax is a lubricant. It will aid in passing the thread easily through the thread-handling mechanisms of the stitcher and through the sole. The wax pot and the thread-handling mechanisms are heated with electrical heating elements. When the stitcher is operating, the temperature of the wax in the wax pot should be held at about 190° F. Heating elements at other points on the stitcher keep the wax on the thread from cooling too much before the thread is sewed. A thermostatic control holds the



Ref. No.	Nomenclature
1	Wax pot thread fork.
2	Wax pot stripper.
3	Wax pot.

Figure 12. Threading wax pot thread fork and stripper.

heat at the point chosen on the control panel by the operator.

b. OPERATION. Heat should be turned on at least 30 minutes before stitching is begun. To turn the heat on, flip the heat switch in the control panel to ON. (See 3, fig. 7.) (With an American model, push the ON button in.) Turn the indicator of the heat control (2, fig. 7) toward the HIGH position as far as it will go. The HIGH position will keep the wax at the proper temperature for sewing. The wax is melted enough to sew when the thread can be pulled easily by hand. To keep the machine warm between operations, turn the indicator of the heat control to the LOW position. In the LOW position,

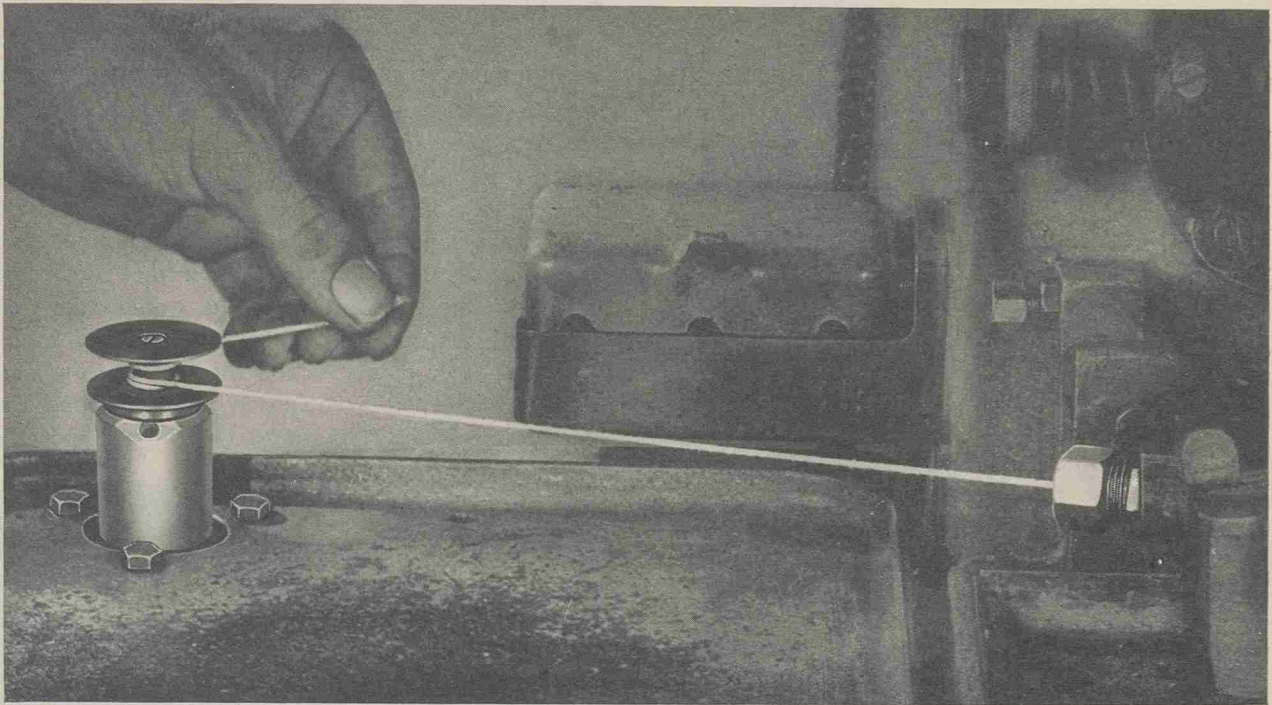


Figure 13. Preparation for winding bobbin.



Figure 14. Bobbin winder control

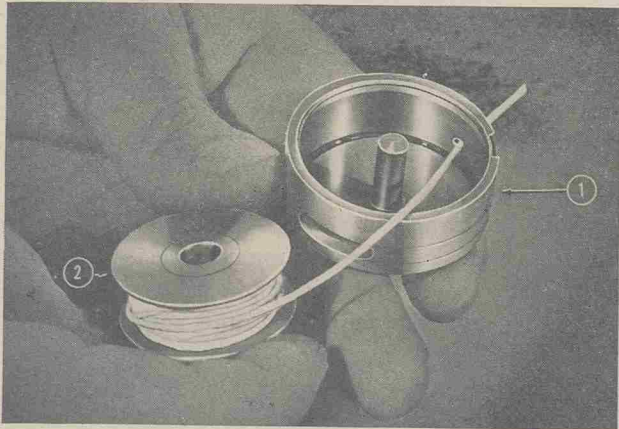
a small amount of current keeps the stitcher from getting cold. The stitcher can be heated to the proper sewing temperature again in 5 to 10 minutes by turning the heat control indicator back to HIGH.

25. Winding Bobbin

- a. Pass the thread through the hole in the side of the bobbin until it extends about an inch beyond the bobbin.
- b. Place the bobbin on the winder thread side first so that when the bobbin is clamped on the bobbin winder the thread will be held fast. Wind at least three loops of thread around the bobbin by hand so that winding will start easily when the bobbin winder shifter handle is engaged. (See fig. 13.)
- c. Start the bobbin winder by pulling the bobbin winder hand lever toward the operator. (See fig. 14.)
- d. Wind the bobbin until the thread is flush with the sides. If the wound thread extends beyond the sides of the bobbin, the bobbin will not fit in the bobbin case.
- e. When the bobbin is full, disengage the bobbin winder by pushing the bobbin winder hand lever away from the operator.
- f. Cut the thread about 2 inches from the stripper so that enough thread hangs out of the heat guard to start the next bobbin. Remove bobbin from winder.

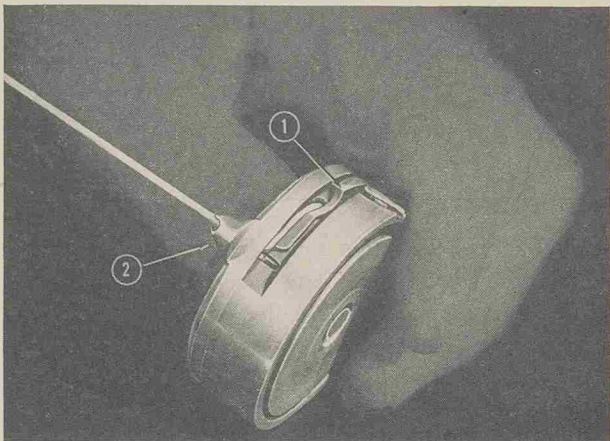
26. Placing Bobbin in Bobbin Case

- a. Pass the cut end of the thread through the hole in the bobbin case. (See fig. 15.)



Ref. No. Nomenclature
1 Bobbin case.
2 Bobbin.
Figure 15. First step in threading bobbin case.

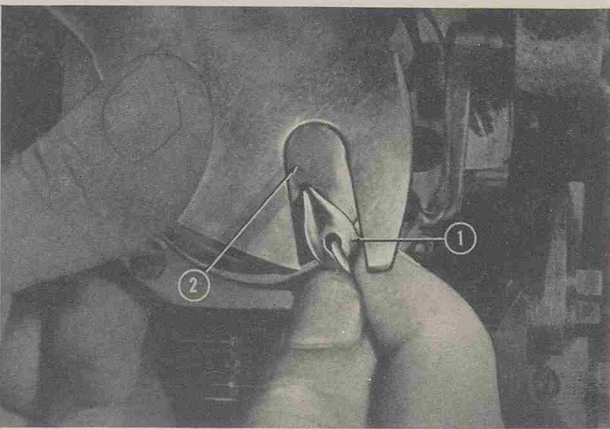
- b. Place the bobbin in the case so that the thread will unwind in the opposite direction to that in which it was wound on the bobbin.
- c. Pass the thread under the tension spring. (See 1, fig. 16.)
- d. And through the horn of the bobbin case. (See 2, fig. 16.)



Ref. No. Nomenclature
1 Tension spring.
2 Horn of bobbin case.
Figure 16. Final step in threading bobbin case.

27. Loading Shuttle (fig. 17.)

- a. Lubricate the shuttle as described in paragraphs 44 and 45.
- b. Place the bobbin case in the shuttle so that the horn on the bobbin case (1, fig. 17) will fit into the slit in the cover (2.)
- c. Push bobbin case guide down.



Ref. No. Nomenclature
1 Horn of bobbin case.
2 Slit in shuttle cover.
Figure 17. Proper position of bobbin case in shuttle.

28. Matching Sizes of Needles, Threads, Awls, and Needle Guides

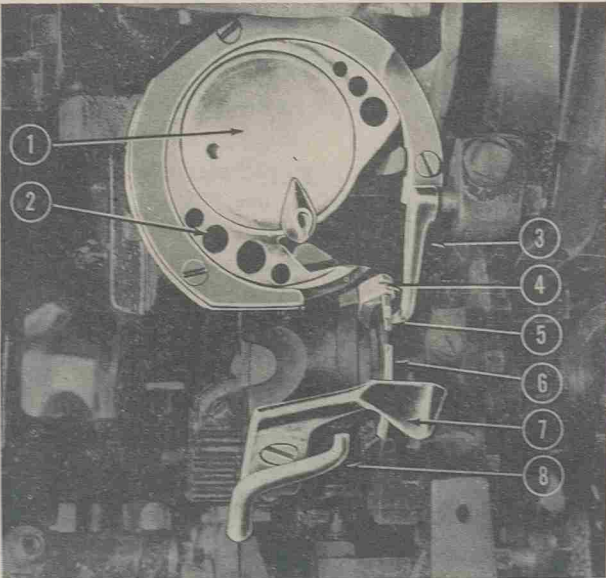
a. The following sizes should be used together :

Needle (No.)	Awl (No.)	Needle guide (No.)	Top thread (cord)	Bobbin thread (cord)
45 or 24	43 or 24	45 or 24	10	9
			9	8
47 or 23	45 or 23	47 or 23	8	7
50 or 22	47 or 22	50 or 22	7	6
52 or 21	50 or 21	52 or 21	6	5
54 or 20	52 or 20	54 or 20	5	4

b. The needle guide must be changed when the needle size is changed. The needle guide is stamped with the number of the needle with which it is to be used.

29. Setting Needle

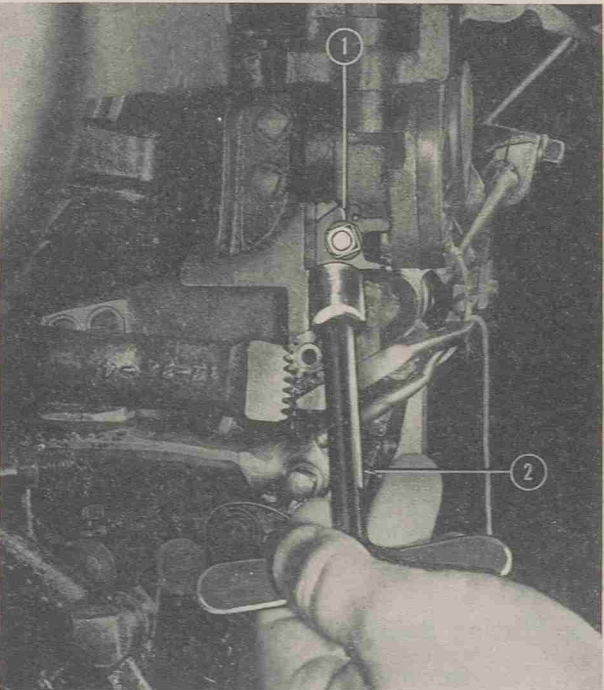
a. The needle is set properly when the barb of the needle is 1/16 inch from the needle guide at the time when the awl is feeding to the left. (See fig. 18.)



Ref. No.	Nomenclature
1	Bobbin case.
2	Shuttle.
3	Lifter.
4	Needle guide.
5	Needle.
6	Awl.
7	Needle plate.
8	Looper.

Figure 18. Relative position of the parts of the face.

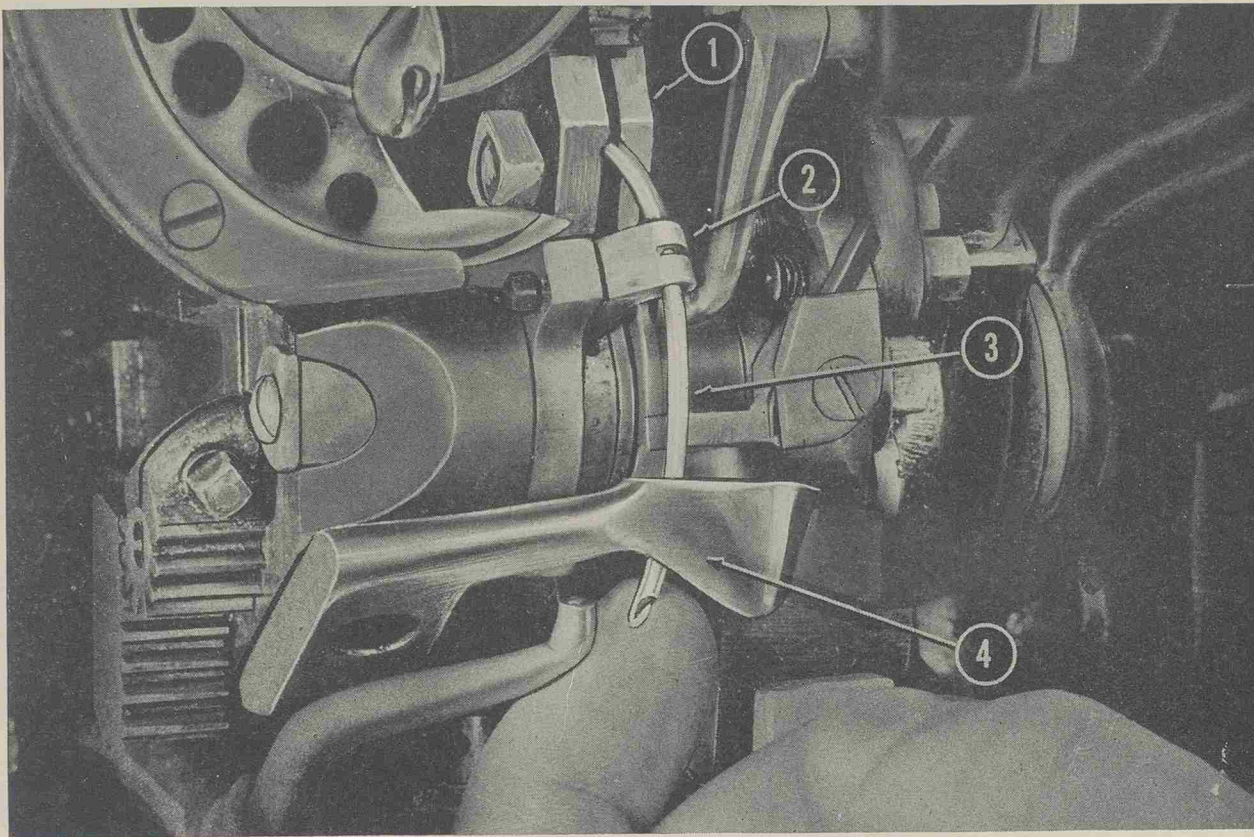
b. To change the needle, turn the handwheel so that the needle is going up and the awl is down. When the point of the needle is 5/16 inch above the needle plate, the needle clamp nut can be reached through the opening between the shuttle case and the shuttle head. (See fig. 19.) Use the socket wrench furnished for that purpose. (See fig. 5.) Release the nut and remove the needle by pulling it through the slot of the work table. When the needle is out of the needle guide, give it a quarter turn toward the shuttle and take it out from the top.



Ref. No.	Nomenclature
1	Needle clamp nut.
2	Needle clamp nut wrench.

Figure 19. Changing needle.

c. If the needle is taken out when its point is 5/16 inch above the needle plate, it can be replaced without removing the needle holder. For that reason, it is then possible to set the new needle (fig. 20) fairly close to the correct position the first time it is set. Then turn the handwheel until both the needle and the awl are going down. At that position, establish the correct relative position of the needle and awl. (See fig. 21.) However, as a further precaution, always check the needle with the needle guide at the point when the awl is feeding to the left. When the needle is set in the correct position, tighten the needle clamp nut securely.



Ref. No.	Nomenclature
1	Needle clamp.
2	Needle guide.
3	Needle.
4	Needle plate.

Figure 20. Inserting needle.

30. Setting Awl

a. The awl should be set $1/16$ inch below the needle and about $1/32$ inch to the left of the needle when both the needle and the awl are moving downward. (See fig. 22.)

b. To remove the awl, begin by throwing the shoe guide forward. (See 2, fig. 45.) Turn handwheel to bring awl holder up. Release the clamp nut. Hold the awl and turn the handwheel to back the awl holder away from the shank of the awl.

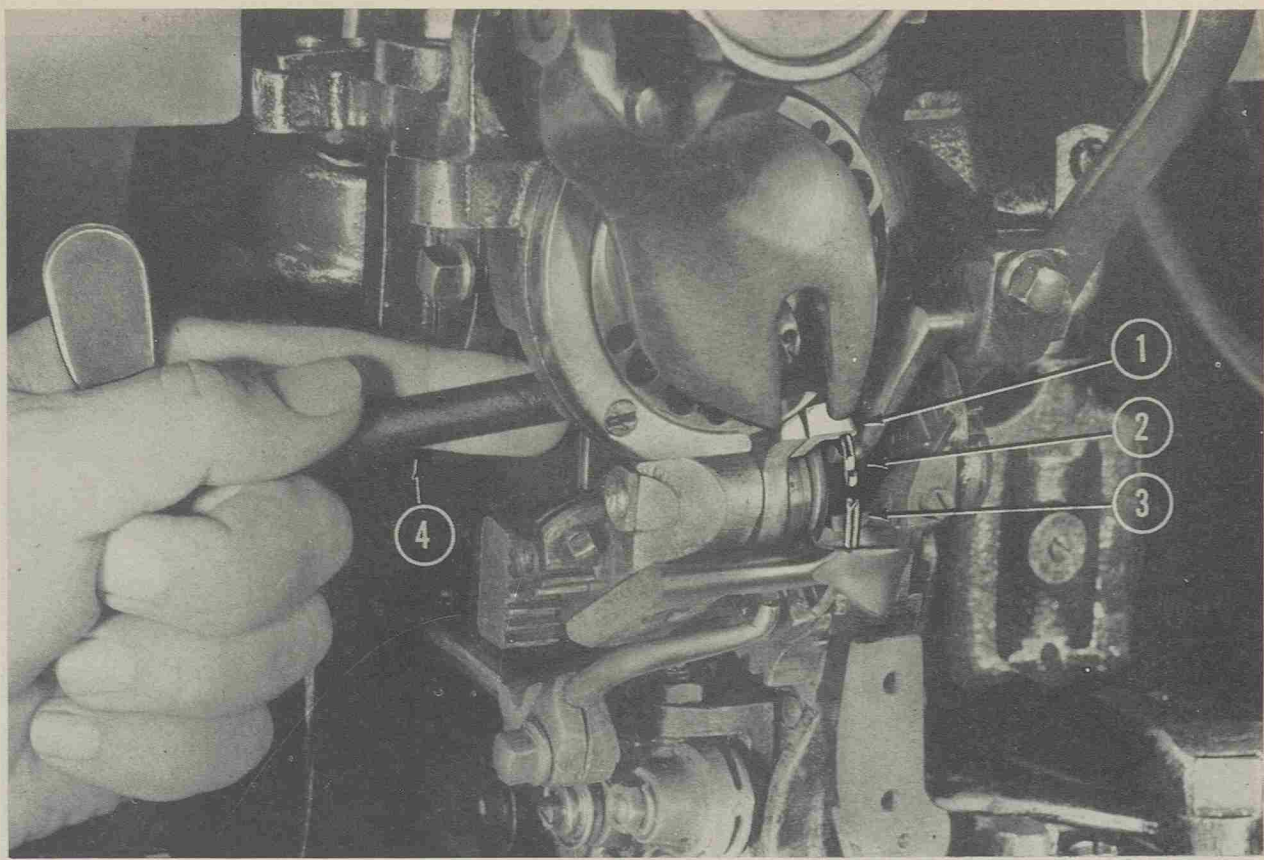
c. To set an awl in position (fig. 22), pass it up through the needle plate. Hold the awl and bring the awl holder up so that the shank of the awl will enter the groove of the holder. When the shank of the awl can be felt just protruding from the lower end of the clamp, tighten the clamp nut. If the awl is fastened in this way, the original setting

will be very close to the correct position. (See fig. 21.)

d. The awl springs out of alignment when it is feeding the shoe. For that reason, the awl should be set so that the awl hole will line up with the needle while carrying the work. The awl should be set to travel about $1/32$ inch to the left of the needle at the end of the feed. That adjustment is made when the awl is set at the end of the feed.

31. Setting Lifter

a. The lifter (3, fig. 23) lifts the right-hand thread from the needle to the shuttle. It should be set to pass as close to the point of the needle (4, fig. 23) as possible and directly in the center of the two threads. (See fig. 24.) There should be $1/32$ inch between the lifter (1, fig. 25) and the shuttle (2, fig. 25) at the closest point.



Ref. No.	Nomenclature
1	Needle guide.
2	Needle.
3	Awl.
4	Needle clamp nut wrench.

Figure 21. Setting needle to awl.

b. To adjust the lifter, loosen the binding screw. (See 1, fig. 23.) The adjustment of the lifter is controlled by means of an eccentric. (See 2, fig. 23.) Move the lifter right or left to line up with the point of the needle. Swing it in or out to clear the shuttle by $1/32$ inch. Move it up and down until it just clears the point of the needle. Tighten the binding screw. (See 1, fig. 23.)

32. Operating Stitcher

a. Turn the handwheel over until the thread take-up lever (9, fig. 49) is at its lowest point.

b. With the left hand, grasp the shoe with the sole facing up.

c. Step on the presserfoot treadle to raise the presserfoot.

d. Place the heel of the shoe under the shuttle case.

e. Tilt the toe of the shoe upward until the welt clears the needle plate or work table and goes back against the shoe guide.

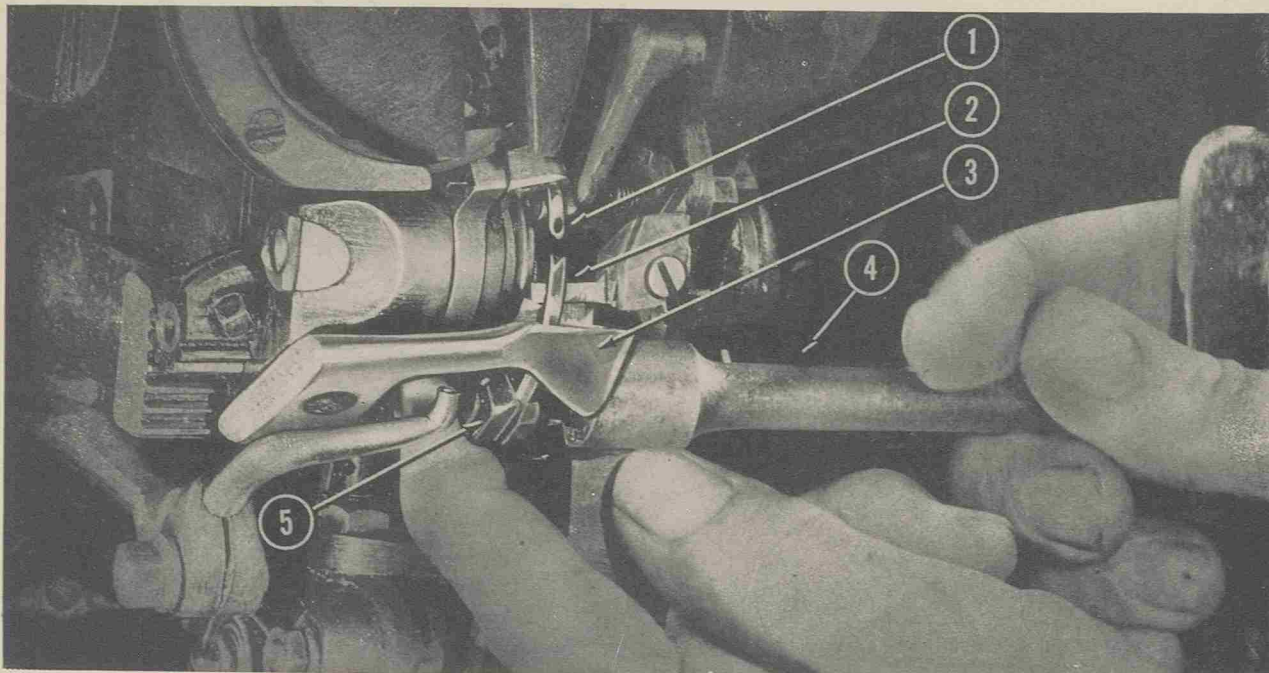
f. Release the presserfoot and set it firmly against the sole of the shoe.

g. Turn the handwheel until the awl pierces the sole.

h. Grasp the toe of the shoe in the right hand and the heel in the left hand.

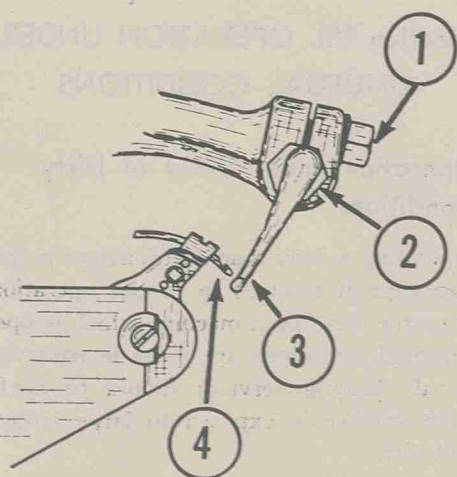
i. Start sewing by pressing down on the clutch pedal with the left foot.

j. As the stitching approaches the toe of the shoe, ease the pressure on the clutch pedal to slow up the machine. At the same time shift the left hand to the left side of the shoe, and shift the right hand to the right side of the shoe. Continue sewing around the toe.



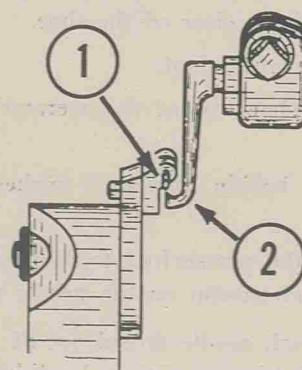
Ref. No.	Nomenclature
1	Needle.
2	Awl.
3	Needle plate.
4	Awl clamp nut wrench.
5	Awl clamp.

Figure 22. Setting awl.



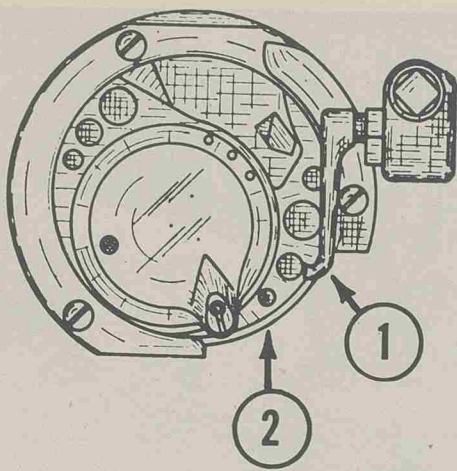
Ref. No.	Nomenclature
1	Binding screw.
2	Eccentric.
3	Thread lifter.
4	Needle.

Figure 23. Lifter needle space adjustment.



Ref. No.	Nomenclature
1	Needle.
2	Lifter.

Figure 24. Vertical alignment of lifter and needle.



Ref. No.	Nomenclature
1	Lifter.
2	Shuttle.

Figure 25. Lifter shuttle space adjustment.

k. After sewing around the toe, slide the right hand to the heel of the shoe and the left hand to the toe. Hold the shoe firmly on the work table until the swing around the sole is completed.

33. Removing Shoe from Machine

- When the stitching is completed, release the clutch pedal. Grasp the handwheel so that the awl does not punch another hole.
- Back the handwheel up with right hand until needle and awl are clear of the shoe.
- Raise the presserfoot.
- Pull the shoe toward the operator and out of the machine.
- Cut the bobbin thread 3 inches from the bobbin.
- Step on the presserfoot treadle to release the thread lock and tension on the needle thread.
- Pull enough needle thread out of the machine so that about 12 inches of thread will hang from the needle after the thread is cut at the shoe. If that amount of thread is not left, the thread will be pulled down through the work table when the machine is being set for the next shoe, and rethreading will be necessary.
- Cut the needle thread close to the sole of the shoe.

34. Requirements for Successful Operation

- Adjust the machine properly.
- Keep the heating system of the machine at the right temperature.
- Prepare the shoes properly for stitching.
- Guide the shoe on the work table.
- Hold the shoe firmly against the shoe guide, but do not force it.
- Do not crowd the shoe into the machine, forcing it to take a longer stitch than it was set to make.
- Do not hold the shoe back from the feeding action of the machine, for that crowds the stitches.
- Do not twist the work into the machine.

35. Safety Precautions

- Shoes should be soft and pliable and so well prepared for stitching that the operator need not put his fingers underneath them to hold back the uppers. Fingers may be hurt whenever they are so placed under the shoe that the operator cannot tell exactly where they are.
- Switch off the motor before putting the fingers into the movable parts of the machine. If the motor is left running, thoughtless or accidental pressure on the clutch pedal may engage it enough to catch them between parts of the machine.

Section VII. OPERATION UNDER UNUSUAL CONDITIONS

36. Operation under Dusty or Dirty Conditions

- Operating a dirty machine damages it far more than the wear it receives in proper operation. Instructions for cleaning a machine which is operating under normal conditions are given in paragraph 47. Additional cleaning services should be performed when the stitcher is exposed to large amounts of dust and dirt.
- Remove all sand and grit from shoes that are to be stitched. It is impractical and unnecessary to attempt to clean soiled leather, but it is important that all abrasive dirt be removed from the shoes.
- Cams should be cleaned at least once a week and more often if the operator can feel grit in the cam races with his finger.

37. Operation in Extreme Heat

Any heat in which the operator can work will affect nothing in the machine except the wax. The condition of the wax should guide the operator in adjusting the heat control for high air temperatures around the machine. The wax should not boil, but it should be soft enough to allow the thread to pull freely through the thread-handling mechanisms of the machine.

38. Operation in Extreme Cold

The total wattage of the heating elements of the stitcher will not keep the wax or the machine warm enough if the air temperature falls much below 60° F. In cold-weather operation, the machine will require more than the normal 30 minutes to warm up. Turn the heat switch on and leave the heat control indicator at HIGH.

Section VIII. DEMOLITION TO PREVENT ENEMY USE

39. General

In a theatre of war, where lines may change rapidly, it may be necessary to dispose of this equipment in order to deny its use to the enemy.

40. Procedure

a. If possible, move the stitcher and its equipment in the shoe repair trailer out of the danger zone to some safe location.

b. If it is impossible to perform the procedure outlined in *a* above, the machine must be demolished so thoroughly that nothing in the stitcher will be useful to the enemy. Use the ax or mattock in the trailer to systematically smash the parts of the machine. Make certain that the cams, feed slide, needle and awl segments, shuttle, lifter, and motor are completely destroyed. All the tools, supplies, and equipment of the stitcher should be burned or buried.

PART THREE

MAINTENANCE INSTRUCTIONS

Section IX. SPECIAL ORGANIZATION TOOLS AND EQUIPMENT

41. Tools

Tools furnished with the stitcher are shown in figures 5 and 6. Additional tools are issued with the two types of shoe repair trailers.

a. TRAILER, TWO-WHEEL, SHOE REPAIR. None of the tools in the tool compartment of the two-wheel shoe repair trailer are to be used on the stitcher. The tools in the tool drawer of the stitcher are adequate to accomplish all the maintenance services the using organization is authorized to perform.

b. SEMITRAILER, SHOE REPAIR. In addition to the tools listed in paragraph 7, the following tools issued with the semitrailer can be used in the maintenance of the stitcher when necessary:

Federal stock No.	Nomenclature	Quantity
41-P-1650.....	Pliers, combination, slip joint, 6-inch.	2
41-S-1062-90..	Screw driver, close quarters, 1½ by ¼-inch blade, 4-inch overall.	1
41-S-1069.....	Screw driver, common, heavy duty, 6-inch blade (type III).	1

42. Supplies

The two-wheel shoe repair trailer carries a 6 months' supply of the following spare parts for the stitcher:

Vendor's part No.	Nomenclature	Quantity
K22-2A	Shuttle ring (bronze).....	2
K22-2N	Shuttle case	1
K22-101N	Bronze bushing for head.....	1
K22-201A	Screw dowel for needle plate...	2
K22-301	Screw for head.....	1
K22-301A	Nut for head stud.....	1
K22-302A	Shuttle ring screw (flathead)..	6
K22-302B	Thread hook rack cap retain- ing screw.	2
K22-302C	Shuttle ring screw.....	3
K22-302FA ...	Shuttle unit clamp retaining screw.	2

Vendor's part No.	Nomenclature	Quantity
K22-302GN ...	Shuttle unit guard cover re- taining screw.	1
K22-302N	Shuttle case to head retaining screw.	2
K22-304	Guide arm bracket retaining screw.	2
K22-304N	Guide arm bracket race screw..	1
K22-305A	Bobbin case guide arm locking lever washer nut.	1
K22-703A	Bobbin case guide arm spring..	1
K22-705C	Bobbin case guide arm operat- ing lever spring.	1
K23-301B	Cam lever shaft setscrew.....	1
K23-302	Headless setscrew for No. two cam.	1
K23-302A	Setscrew for No. two cam.....	1
K23-303	Headless setscrew for No. three cam.	1
K23-303A	Setscrew for No. three cam....	1
K23-304	Setscrew for No. four cam....	1
K23-305D	Setscrew for handwheel.....	1
K24-7C	Needle guide, size 45.....	24
K24-8K	Needle plate, long stitch.....	6
K24-307	Needle guide screw.....	3
K24-308	Needle plate retaining screw...	3
K24-507	Needle guide dowel pin.....	6
K25-4	Shuttle	2
K25-5B	Bobbin case, assembled.....	1
K25-705B	Bobbin case tension spring.....	1
K26-3A	Feed-adjusting lever slide block.	1
K27-5L	Channel presserfoot, style No. 3.	2
K27-5H	Channel knife for style No. 3..	3
K27-305	Presserfoot-retaining screw....	2
K27-307	Presserfoot-raising lever screw.	1
K27-706	Presserfoot spring	1
K28-705	Auxiliary take-up lever spring..	2
K29-5	Looper	6
K29-6	Thread hook	1
K29-10	Thread lifter	6
K29-305	Looper binding screw.....	1
K29-310	Thread lifter binding screw....	1
K31-908E	Wax pot stripper rubber.....	12
400 7-301	Stitcher retainer bolts and nuts.	4

43. Accessories

The two-wheel shoe repair trailer carries a 6 months' supply of the following stitcher accessories:

Nomenclature	Quantity
Belting and hooks (complete set).....	1
Rough service lamp, 50-watt.....	1
Electric light bulbs, 50-watt (extras).....	2

Section X. LUBRICATION

44. Lubrication Chart

a. The lubrication charts presented in figures 26 and 27 prescribe first and second echelon lubrication maintenance.

b. The service intervals specified in the lubrication charts are for normal operating conditions. Under extreme conditions, such as excessively high or low temperatures, prolonged periods of high speed, continued operation in sand or dust, immersion in water, or exposure to moisture, the intervals should be reduced. Failure to reduce them may result in malfunctioning or damage to the machine.

c. The lubricants prescribed in the KEY are to be used in all temperature ranges. Since the stitching machine is rarely operated at temperatures below 32° F., it will not be necessary to change the grade of lubricant to accommodate those ranges below 32° F. Engine oil (OE) No. 50 will be used to lubricate the head of the machine; OE No. 30 will be used on the motor; and OE No. 10 will be used on the stand.

45. Detailed Lubrication Instructions

a. LUBRICATION EQUIPMENT. Each stitcher is supplied with lubrication equipment adequate to maintain it. Make certain the lubrication equipment is cleaned both before and after use. Operate the equipment carefully and in such a manner as to insure a proper distribution of the lubricant.

b. POINTS OF APPLICATION. Lubrication fittings and oilers are readily located by reference to the lubrication charts, which are supplemented by individual photographs of the points of lubrication. (See figs. 28 to 38 incl.) Wipe the lubricators and surrounding surfaces clean before applying lubricant.

c. CLEANING. Use dry-cleaning solvent or Diesel fuel oil to clean or wash all parts. Use of gasoline for this purpose is prohibited. After washing, dry all parts thoroughly before applying lubricant.

d. LUBRICATION NOTES ON INDIVIDUAL UNITS AND PARTS. The following instructions supplement those notes in the lubrication charts which pertain to lubrication and service of individual units and parts:

(1) *Cams*. Twice every day lubricate the cam races and cam rollers with the oil prescribed. Apply the lubricant with a soft brush, and if the cams feel gritty under the brush, clean the cam races and

surfaces.

(2) *Shuttle and bobbin case*. Every time the bobbin case is replaced in the machine it should be oiled. Fill the hinge cap oiler with the prescribed oil to the level of the oiler. A few drops of oil should be placed around the shuttle case.

(3) *Reservoirs in head assembly*. Every day the following reservoirs should be filled with the prescribed oil until the level is visible in the hinge cap oiler.

(a) Feed slide oiler.

(b) Slide block lever pivot stud oiler.

(c) Shuttle drive and needle and awl segment oiler.

(d) Thread lock cam lever pivot stud oiler.

(4) *Oil can points of head assembly*. Twice a day lubricate the following parts with two or three drops of the prescribed oil:

(a) Needle guide stud.

(b) Camshaft oilers.

(c) Thread lifter lever pivot stud.

(d) Thread lifter lever slide block.

(e) Feed cam lever pivot stud.

(f) Thread measure bracket eccentric stud.

(g) Thread measure adjusting slide stud.

(h) Feed and slide adjusting block.

(i) Feed and guide retaining plate.

(j) Rocker arm swivel connection stud.

(k) Needle segment stud.

(l) Needle guide driving pinion.

(m) Looper bar guide.

(n) Thread lock toggle lever stud.

(o) Auxiliary take-up lever stud.

(p) Thread lock lever bushing.

(q) Thread lock rocker shaft.

(r) Thread take-up lever.

(s) Take-up cam lever connection stud.

(t) Take-up lever pivot stud.

(u) Presserfoot cam lever eccentric.

(v) Presserfoot cam lever pivot stud.

(w) Forward motion cam lever pivot stud.

(x) Roll stud side motion looper cam lever.

(y) Looper cam lever slide block.

(5) *Bobbin winder*. Twice a day lubricate the following parts of the bobbin winder assembly with two or three drops of the prescribed oil:

(a) Bobbin winder shaft.

(b) Bobbin winder shifter lever shaft (two points).

(6) *Motor*. Every day add a few drops of the prescribed oil to the two hinge cap oilers located at

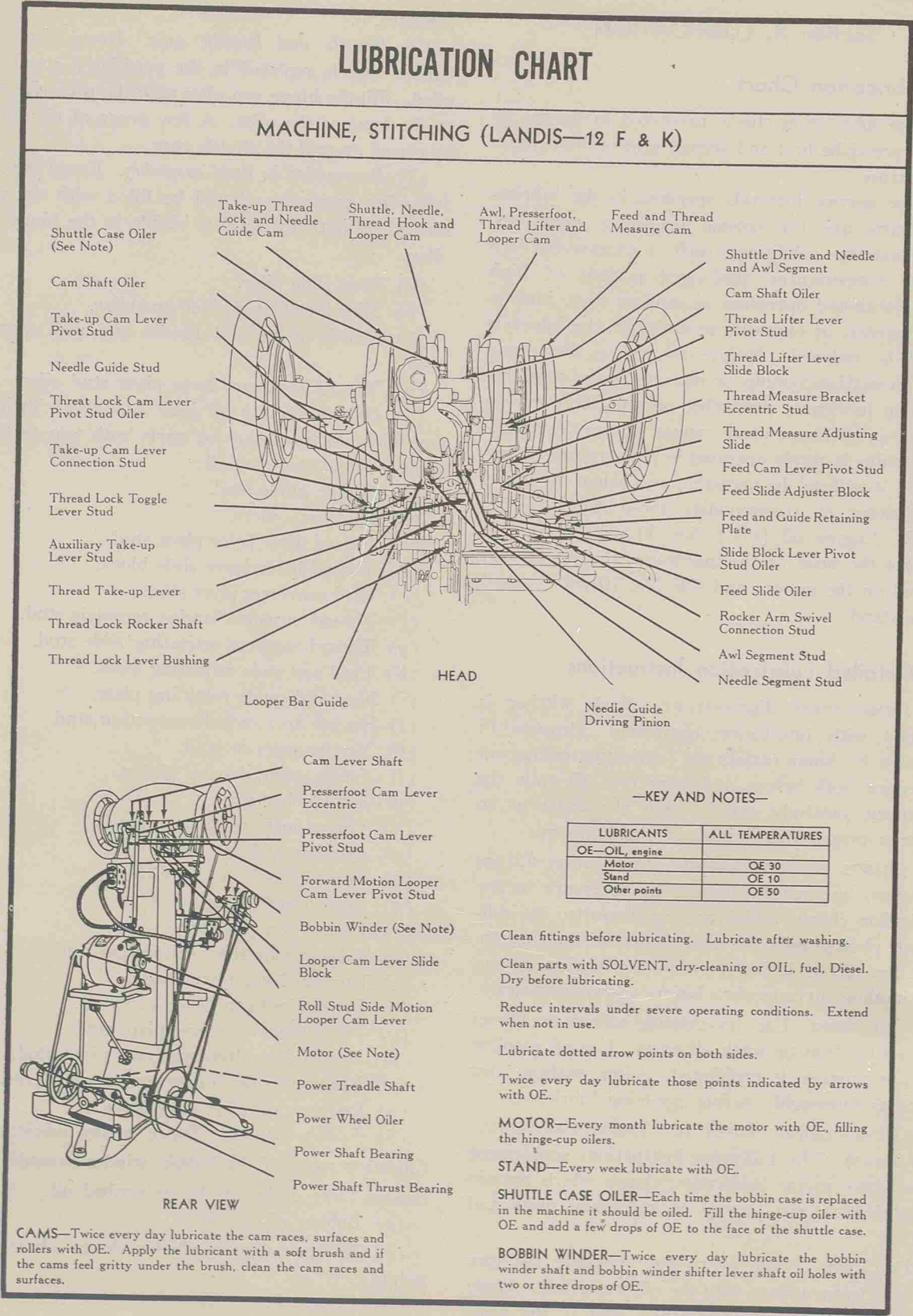
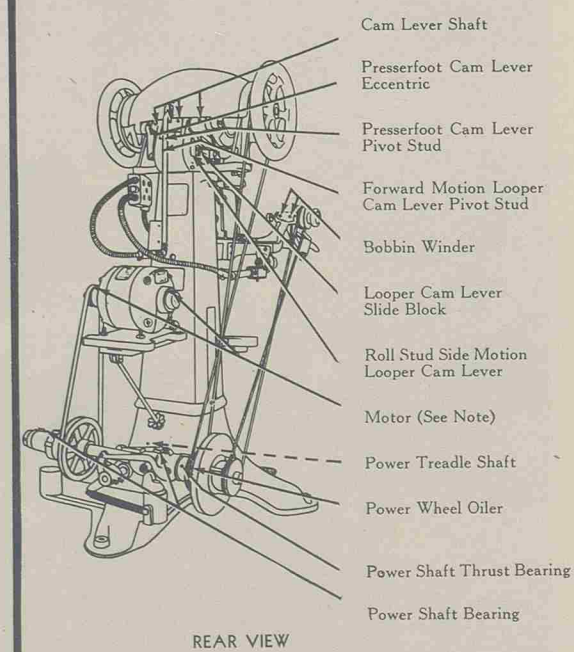
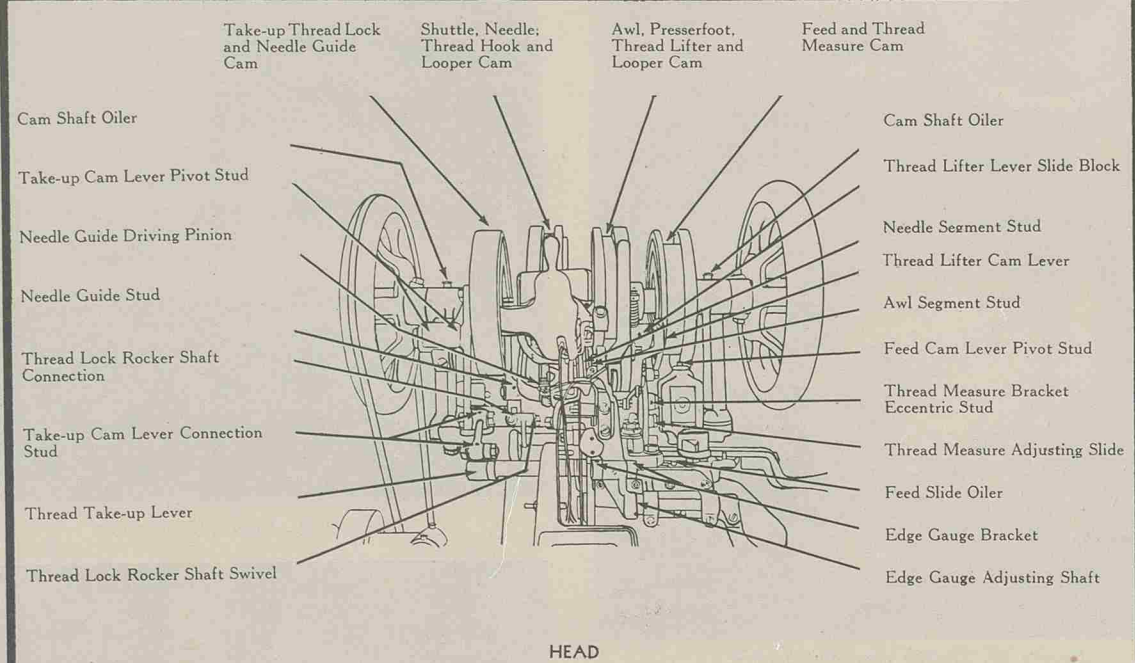


Figure 26. Lubrication chart (Landis models F and K).

LUBRICATION CHART

MACHINE, STITCHING (AMERICAN—B, C, CA)



SHUTTLE CASE—Each time the bobbin case is replaced in the machine it should be oiled. Apply several drops of OE to the face of the shuttle case.

KEY AND NOTES

LUBRICANTS	EXPECTED TEMPERATURES	
	Above 32° F.	Below 32° F.
OE—OIL, engine		
Motor	OE 30	OE 10
Stand	OE 10	OE 10
Other points	OE 50	OE 30

Clean fittings before lubricating. Lubricate after washing.

Clean parts with SOLVENT, dry-cleaning or OIL, fuel, Diesel. Dry before lubricating.

Reduce intervals under severe operating conditions. Extend when not in use.

Lubricate dotted arrow points on both sides.

Twice every day lubricate those points indicated by arrows with OE.

MOTOR—Every month lubricate the motor with OE, filling the hinge-cap oilers.

STAND—Every week lubricate with OE.

BOBBIN WINDER—Twice every day lubricate the bobbin winder shaft and bobbin winder shifter lever shaft oil holes with two or three drops of OE.

CAMS—Twice every day lubricate the cam races, surfaces and rollers with OE. Apply the lubricant with a soft brush and if the cams feel gritty under the brush, clean the cam races and surfaces.

Figure 27. Lubrication chart (American models B, C, and CA).

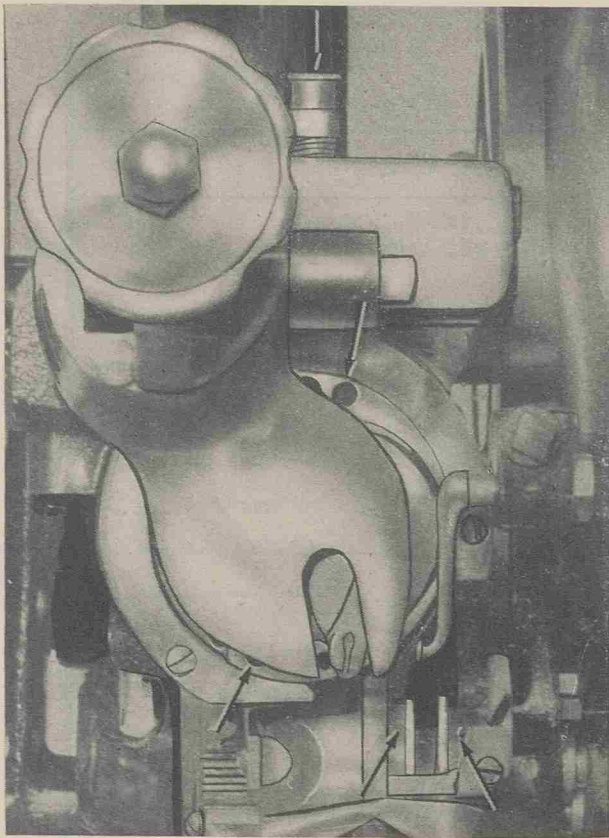


Figure 28. Shuttle case and bobbin.

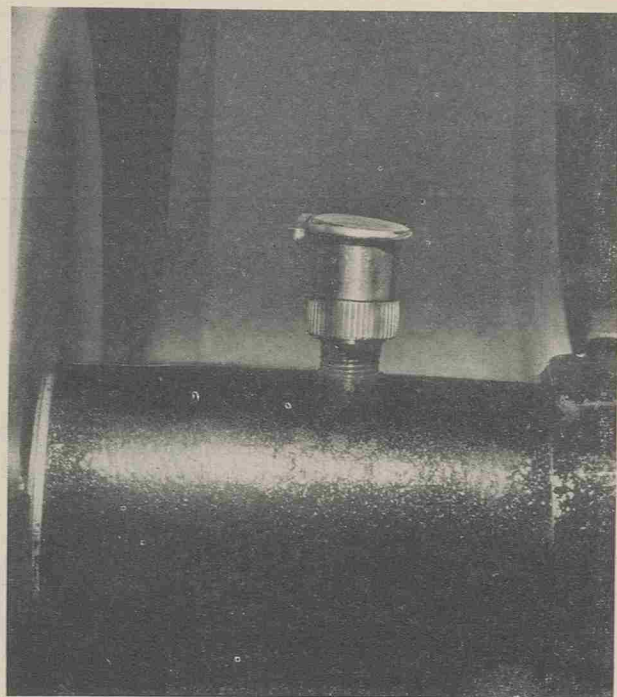


Figure 30. Camshaft bearing.

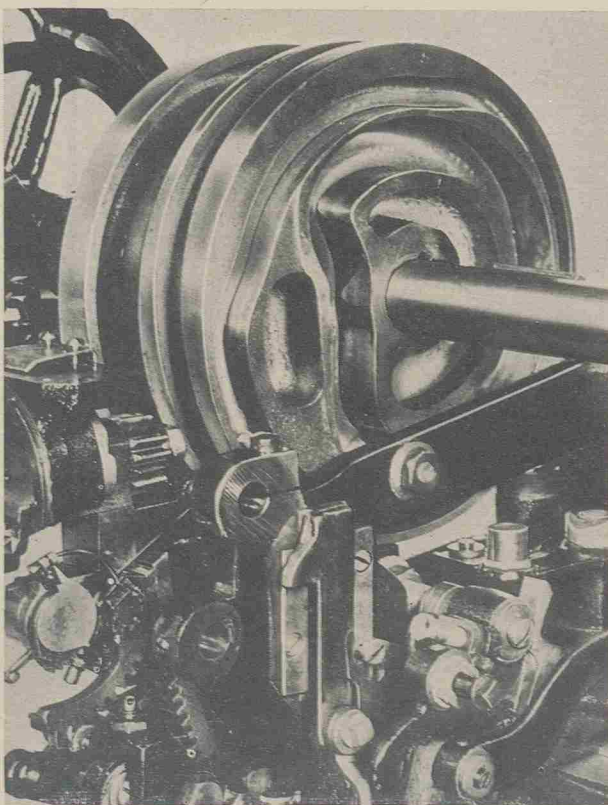


Figure 29. Cam races and rollers.

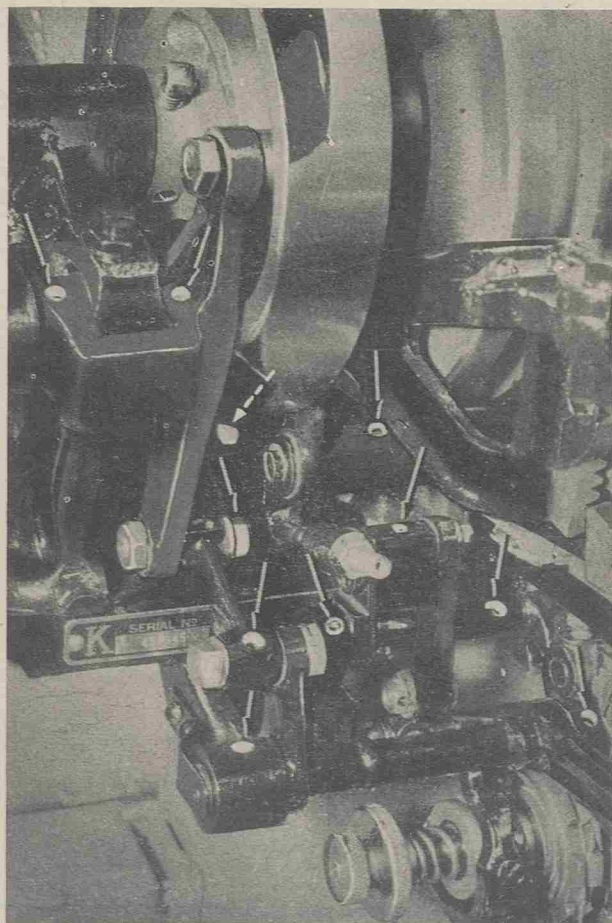


Figure 31. Head bearings—left side.

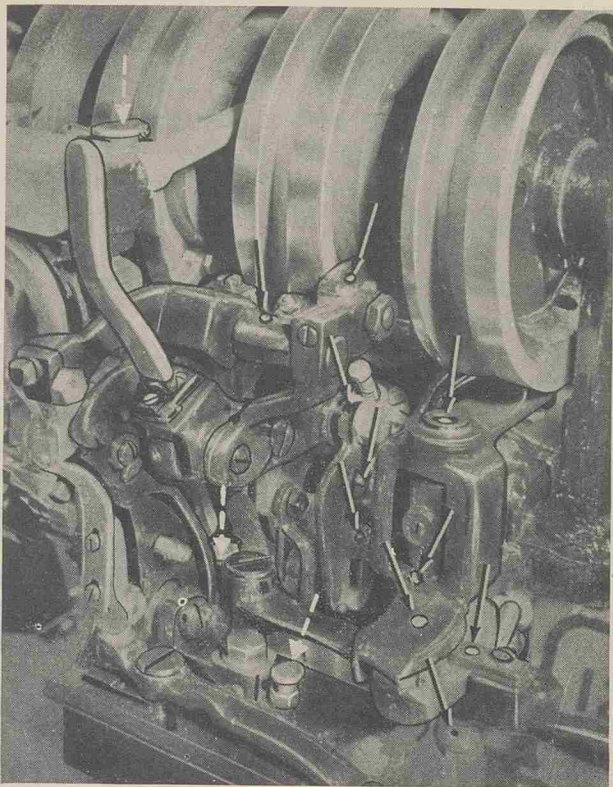


Figure 32. Head bearings—right side.

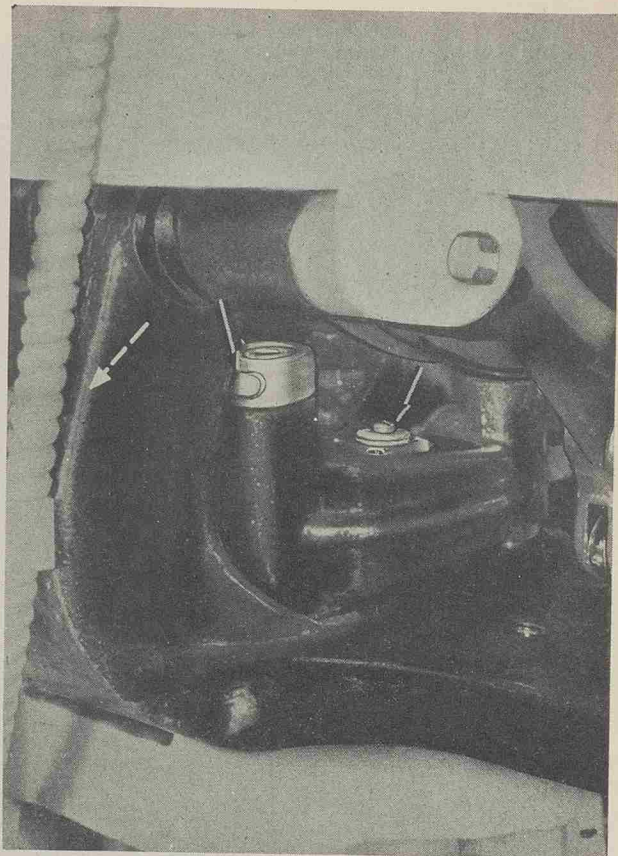


Figure 34. Looper cam lever bearings.

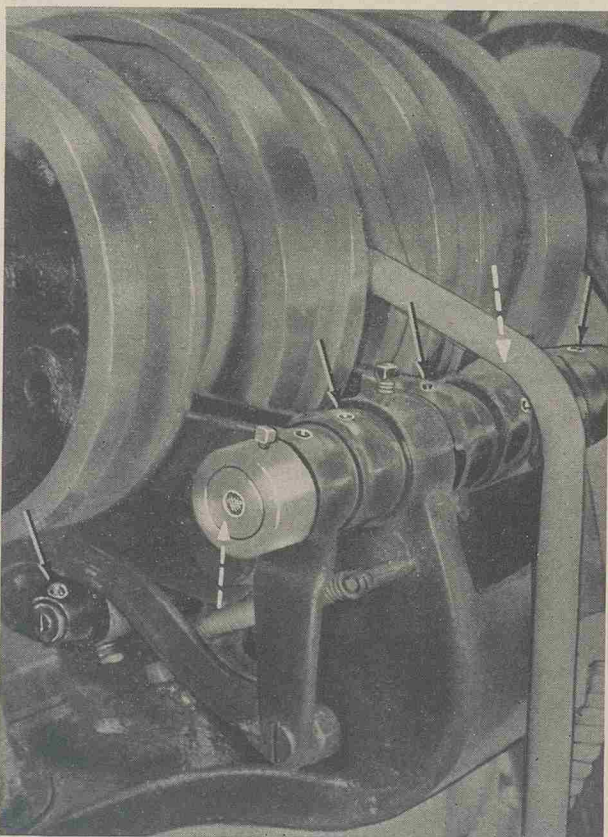


Figure 33. Cam lever shaft bearings.

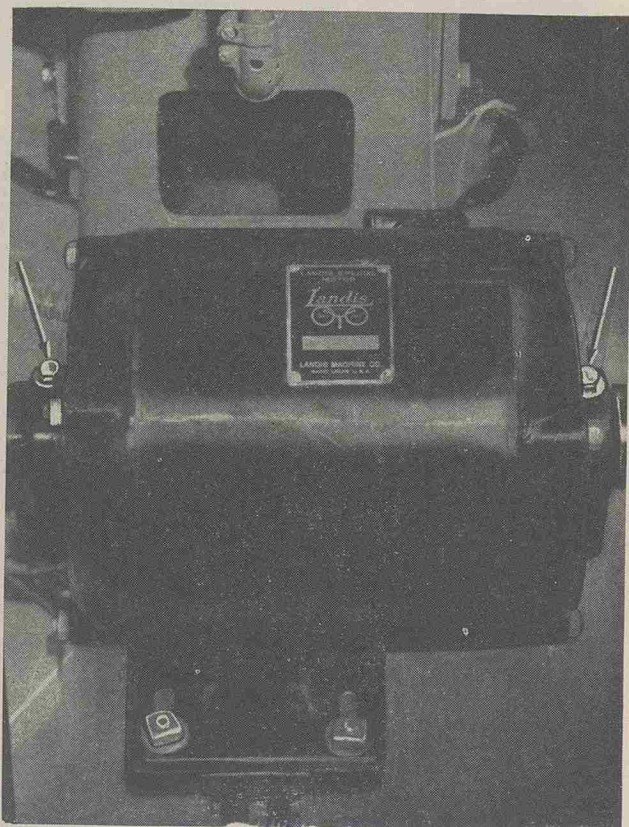


Figure 35. Motor.

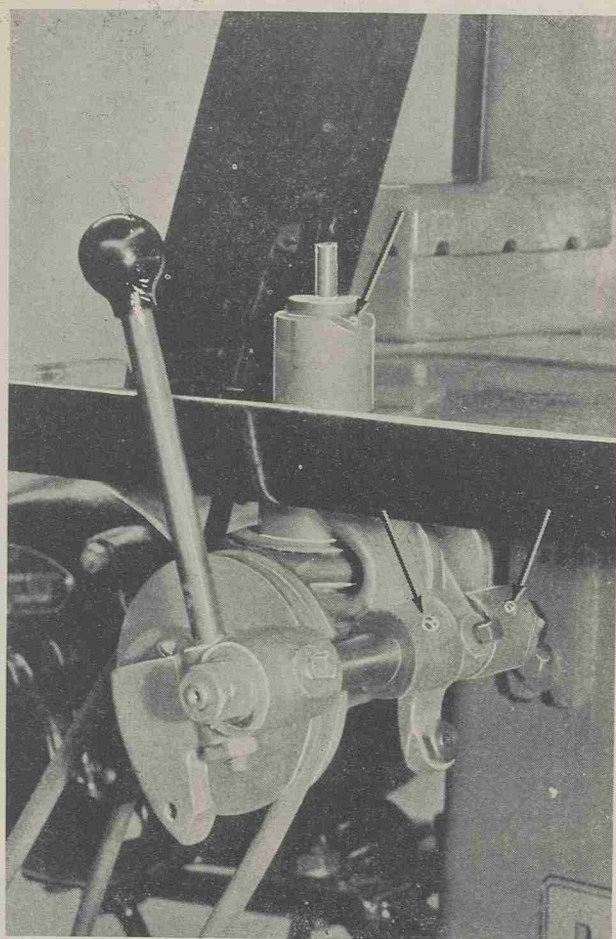


Figure 36. Bobbin winder bearings.

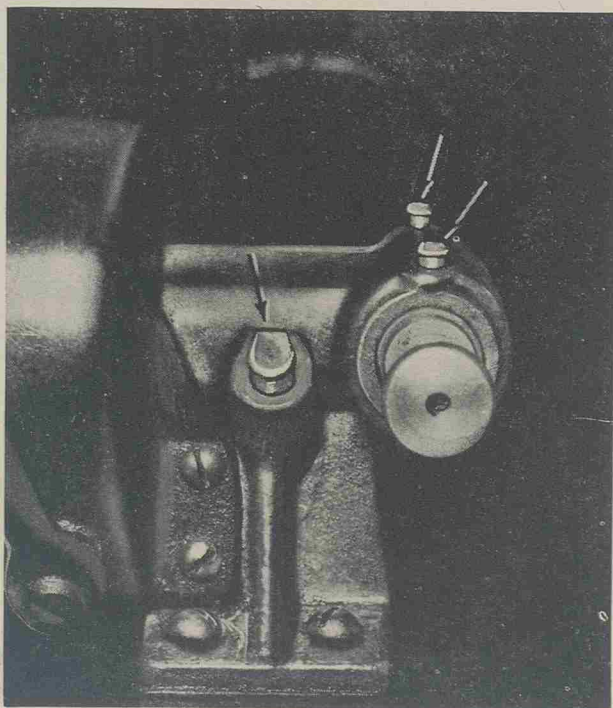


Figure 37. Power shaft bearings.

each end of the motor.

(7) *Cam lever shaft.* Twice a day add two or three drops of the prescribed oil to the four oil holes located on the top of the cam lever shaft.

(8) *Stand.* Twice every day lubricate the following parts with two or three drops of the prescribed oil:

(a) Power shaft bearing (three fittings as illustrated in fig. 38).

(b) Power treadle shaft.

(c) Power wheel oiler.

e. **REPORTS AND RECORDS.** (1) A record of lubrication may be maintained on WD AGO Form 460.

(2) Report unsatisfactory performance of equipment and lubricants on WD AGO Form 468, to the Reclamation Branch, Field Service Division, Office of The Quartermaster General, in accordance with pertinent War Department circulars.

Section XI. PREVENTIVE MAINTENANCE

46. General

Preventive maintenance services are performed by the maintenance personnel of the using organization. These services consist generally of before-, during-, and after-operation services performed by the operator; and the scheduled services (weekly and monthly) performed by organizational maintenance personnel.

47. Operator Maintenance (First Echelon)

a. **BEFORE-OPERATION SERVICE.** (1) *General.* This inspection schedule is designed primarily as a check to see that the stitcher has not been damaged or tampered with since the last after-operation service was performed.

(2) *Procedures.* (a) *Heat.* Turn on the heat so that the machine will be warming up while the before-operation inspections are made.

(b) *Tampering and damage.* Examine the cam races, visible parts of the face of the stitcher, wiring, and motor for any damage or any evidence of sabotage.

(c) *Wax.* Remove the cover of the wax pot (fig. 9) and check the condition of the wax. Wax should be clear and the wax pot should be half full. If necessary, add wax until the melted wax reaches the proper level.

(d) *Thread tension.* Check the tension of the needle and bobbin thread. When the wax is hot, the

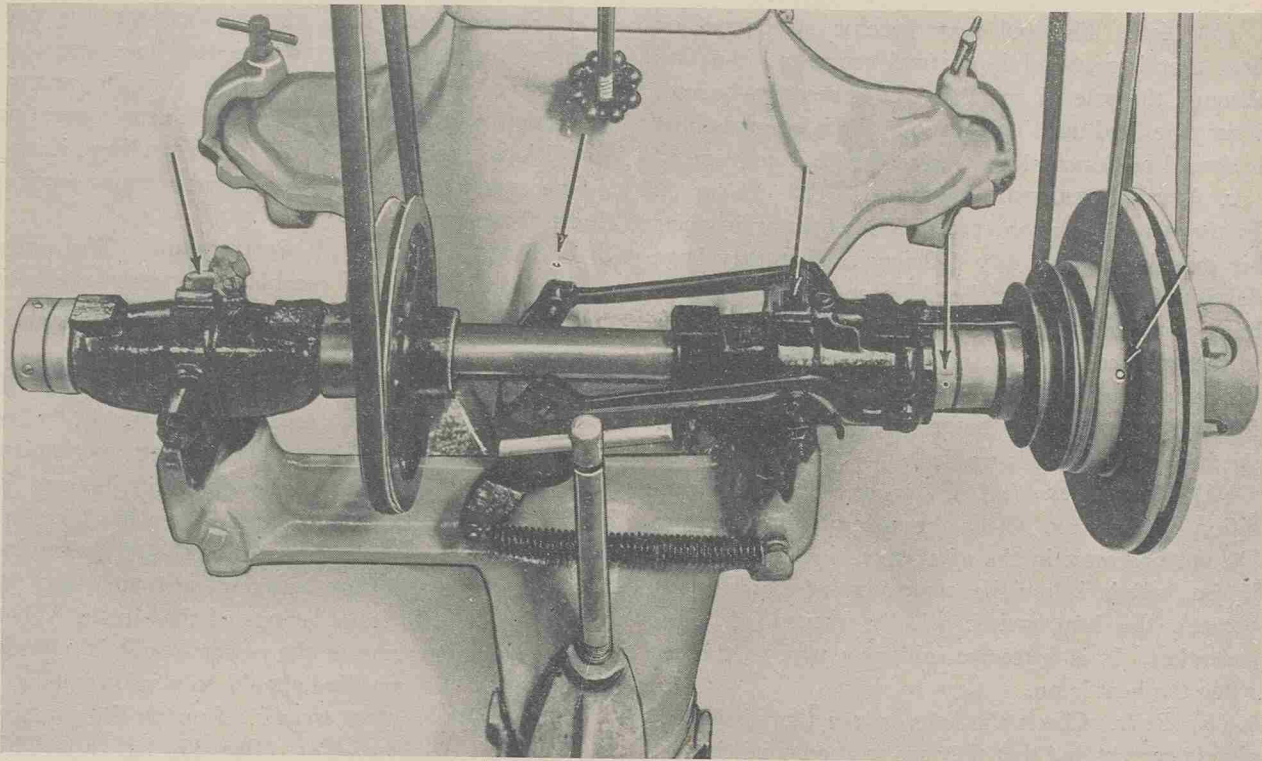


Figure 38. Stand bearings.

thread should pull easily through the tensions.

(e) *Needle and awl.* Turn the handwheel with the right hand and check to see that the needle and awl are tracking properly and are set in the correct relative position.

(f) *Clutch.* Start the motor. Step on the power treadle. (See 13, fig. 1.) The clutch should engage smoothly and the speed of the machine should increase until the power treadle is all the way down. The machine should come to a stop quickly when pressure on the power treadle is released.

(g) *Lubrication check list.* Check each of the following points as part of each before-operation service.

1. Camshaft column oil cup.
2. Needle guide and segment assembly.
3. Shuttle case.
4. Slide block lever pivot stud.
5. Cams and cam rollers.

6. Needle cam lever and awl cam lever.
7. Needle and awl segments.
8. Needle guide cam lever.
9. Needle guide arm.
10. Shuttle and bobbin assembly.
11. Cam lever shaft.
12. Power driving shaft bearings.
13. Thread rolls.
14. Bobbin winder.

b. DURING-OPERATION SERVICE. (1) *General.* When the operator has become familiar with his machine he is quick to notice small changes in its sound and touch during operation. When the operator notices any change, he should stop the machine and locate the cause by turning the machine over by hand and closely watching the operation of the various parts of the stitcher.

(2) *Procedures.* (a) *Needle and awl.* Check the tracking of the needle and awl in operation. The path of the needle should truly enter the hole made by the awl.

(b) *Awl*. The awl may become so burred or bent that it runs off its normal course as it passes through the sole of the shoe. If it becomes burred, it may be filed until it is smooth. If it becomes bent it should be removed and replaced with a new one.

c. AFTER-OPERATION SERVICE. (1) *General*. In the after-operation service, the operator inspects his machine to find any deficiencies that may have developed during operation. He corrects those that he is permitted to handle. He will report any others to the unit mechanic or the authority responsible for the maintenance of the stitcher. If this schedule is followed thoroughly, the stitcher will be ready to operate whenever it is needed.

(2) *Procedures*. (a) *Wax pot*. Check the condition of the wax. Clean the wax pot if necessary. Do not add wax in the after-operation service even if the wax is below the operating level in the pot, because the heat switch will be turned off after operation. It is better to add new wax to the pot when the heat is on.

(b) *Belts*. Check the belts to see that their tension is correct and that they are in good condition.

(c) *Wiring*. Inspect all wiring to see that it is securely connected, clean, and undamaged.

(d) *Cleaning*. Clean all thread-handling parts with a cloth or brush soaked in Diesel fuel or cleaning solvent to remove accumulations of hard wax. Wipe down the exposed surfaces of the machine with a dry cloth. Once a week, clean the cam races with a brush soaked in a solution of Diesel fuel containing about 15 percent machine oil.

(e) *Screws and nuts*. Once a week check the tightness of the cam setscrews and the retaining screw on the needle clamp, awl clamp, and needle guide.

(f) *Lubrication*. Lubricate all points for which daily or twice-daily lubrication is indicated in the lubrication charts. (See figs. 26 and 27.)

(g) *Tools*. Inspect and count the tools in the tool drawer to see that all of them are present and in good condition.

48. Organization Maintenance (Second Echelon)

Regularly scheduled maintenance inspections and services are a preventive maintenance function of the using unit. They are the responsibility of commanders of the operating organizations or installations.

a. FREQUENCY. The intervals between the preventive maintenance services listed here are considered a minimum requirement for the normal operation of the machine. Under unusual operating conditions, such as dusty, dirty surroundings, it may be necessary to perform certain maintenance services more frequently.

b. FIRST ECHELON PARTICIPATION. The operator should be at his machine and assist the unit mechanic while second echelon preventive maintenance services are performed.

c. PROCEDURES. (1) *Weekly*. (a) *Running tests*.

1. *Clutch*. Step on the power treadle. (See 13, fig. 1.) The stitcher mechanism should start smoothly and increase in speed until the treadle reaches the stop. If the clutch grabs or chatters, examine the linkage between the treadle and the collar and facings of the clutch. When pressure on the power treadle is released the machine should stop immediately.

2. *Presserfoot treadle*. Step on the presserfoot treadle. (See 12, fig. 1.) This action should raise the presserfoot, and release the thread tension and thread lock. If the action fails, or is sluggish, check the linking connections between the treadle and the presserfoot, thread tension, and lock. Adjust connections so that they are snug without binding.

(b) *Hand operation tests*.

1. *Clearances*. While the machine is being operated, observe the clearance between the looper and the needle (par. 61), the lifter and the needle (par. 31), and the needle and the awl. (See par. 30.) If clearances are incorrect, adjust as prescribed in the appropriate paragraph.

2. *Bearings*. When the handwheel is being turned by hand, the motion should be even and easy. If binding is felt at any point in the rotation of the wheel, check, one by one, the bearings which are affected by the action of the cams at that point in the rotation of the handwheel. All the bearings on any one shaft must be aligned correctly, and snug enough to prevent play in the shaft without binding.

3. *Motor*. Check the alignment of the motor pulley and the countershaft pulley.

Unit mechanic will not attempt to repair mechanical failure within the motor.
(2) *Monthly.* No monthly service is prescribed.

Section XII. TROUBLE SHOOTING

49. General

This section contains trouble-shooting information which can be of help in determining and removing the causes of trouble that may develop in this machine. The principal symptoms of trouble are broken needles and thread. Paragraph 50 lists the causes for broken needles and their remedies. Paragraph 51 lists the causes for broken threads and their remedies.

50. Causes and Remedies for Broken Needles

Possible cause	Remedy
Awl is burred, causing needle to punch its own hole.	Remove awl. File burs until awl is smooth. Reinstall.
Awl is bent, causing needle to punch its own hole.	Replace with new awl.
Awl is improper size.....	Awl should be one size larger than needle for regular work and two sizes larger for heavy work. Replace with awl of proper size. (See par. 28a.)
Improper preparation of shoe.	Welt should be pressed to the outsole in order that cement may adhere properly. If leather outsoles are used, they should be tempered. All outsoles, whether leather or rubber, should be shaped to conform to the shape of the shoe. Any inserts should have a gradual approach. Nails in shank should not be in path of seam. Stitches in welts of shoes previously repaired should be picked prior to attaching another sole.
Shoe retarded in sewing which prevents proper needle and awl alignment.	Do not force, retard, twist or otherwise distort the work when feeding the machine. Merely guide the work and let the machine do the rest.
Thread too large for needle so that barb of needle is pulled off as it passes through the sole.	Use needle large enough to confine all strands of thread within the hook. (See par. 28a.)
Needle and awl too small for the thickness of the work.	Use larger needle and awl. (See par. 28a.)
Wax in poor condition makes thread inflexible.	When wax oils have evaporated and become black, wax will

Possible cause	Remedy
Improperly thrown into barb of the needle, it may pull barb from needle.	harden as soon as it is exposed to air. Wax should always be white. Clean out wax pot occasionally, and add fresh wax daily. In cold-weather operation, take special care that wax is at right temperature before operation begins.
Misalignment.	Check needle clamp. Check needle guide to see that it is not broken or damaged and that the needle guide dowels are not sheared off.

51. Causes and Remedies for Broken Thread

Possible cause	Remedy
Lock stitch pulled too deep.	Check condition of wax. If wax loses its oils, the thread becomes so inflexible that it cannot be pulled into the outsole (tap) properly. Adjust the bobbin thread tension to a moderate drag.
	Set stitcher thread tension so that take-up does not steal thread when the lock is open.
	Adjust thread measure to pull bobbin thread into the stitch about one-third the thickness of the outsole.
Stranding	Check setting of needle in relation to needle guide. Hook of needle should be set 1/16 inch from needle guide so that thread is not pinched between needle and guide.
	See that the lifter just clears point of needle and is directly in line with needle point when lifter is rising in front of needle.
	Looper must be set to lay thread about 1/16 inch above needle barb so that all strands of thread are confined by the barb. Looper must clear hook when passing under it.
	Auxiliary take-up must function to hold thread taut when looper carries thread around needle. Take-up should pull down about 1/16 inch during that cycle. Several stitches should be made before the final setting of take-up is made.
Dried-out bobbin	Bobbin thread must be flexible. Remove bobbin. Replace it with fresh bobbin, with thread newly waxed and wound.

Possible cause	Remedy
Bobbin case retained preventing passage of thread around shuttle.	Adjust eccentric fulcrum pin of the latch so that there is a space of 1/32 inch between retainer and bobbin case. Thread must not stick when passing through that space.
Stranding caused by burs in path of thread.	Check for burs on all thread-handling parts and surfaces over which the thread passes. Give particular attention to burs on looper and work table. When burs are discovered, they should be removed with a file.
Cold machine	The machine must be hot and the wax fluid before operation is begun. Gummy wax may increase thread tensions to the point of breaking the thread.

Section XIII. STAND ASSEMBLY

52. Description

The stand assembly includes the power shaft and power transmission units, stand base, power treadle, presserfoot treadle, and intermediate parts. Most adjustments of the components of this assembly can be made without disassembly. However, in actual practice, the unit mechanic is authorized to completely disassemble this assembly in order to replace parts. Disassembly and assembly are described in paragraphs 53 and 55.

53. Disassembly (fig. 39)

- a. Remove belts to the bobbin winder, hand-wheel, and motor pulley.
- b. Loosen the setscrews in the short set collar (7, fig. 39) at the right end of the power shaft (8), and remove the collar from the end of the shaft.
- c. Remove the thrust bearing (6).
- d. Loosen the setscrews in the power shaft bearing fiber washer (13).
- e. Loosen the setscrews in the drive shaft drive pulley (not shown).
- f. Remove the screw in each of the two power belt wheel releasing arms (17), and remove the arms.
- g. Remove the setscrews in the power friction pulley (19).
- h. Observe the relative position of the power friction pulley and the power belt wheel (20), at the left end of the shaft, so that when they are replaced their setting will require little adjustment

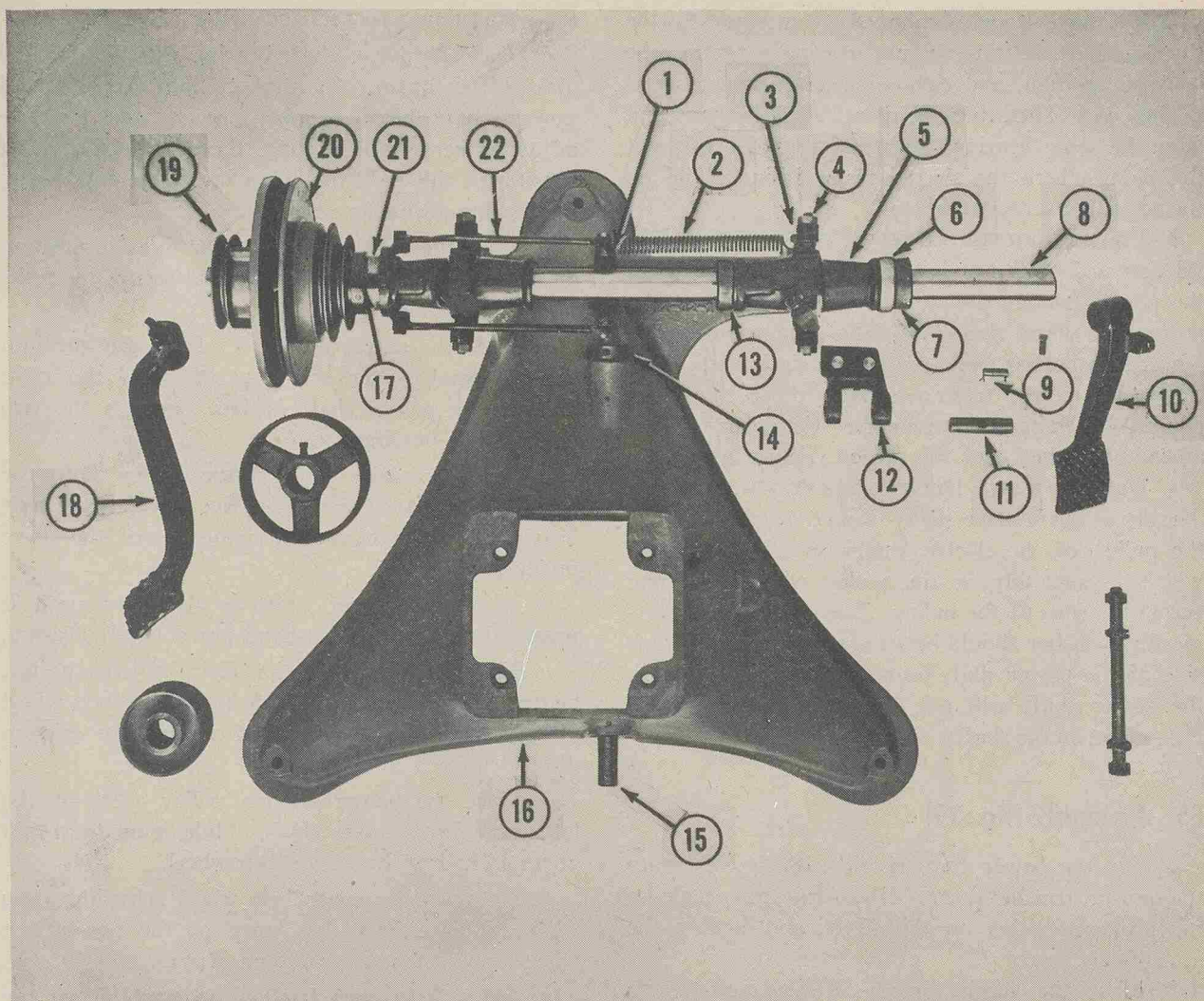
to the correct position.

- i. Remove the power friction pulley.
- j. Remove the power belt wheel.
- k. Remove the power friction disk (21).
- l. Slide the power shaft out of the power shaft bearings (5) from the left until the right end of the power shaft is free between the two bearings. Remove the power shaft bearing fiber washer and the drive shaft drive pulley from the right end of the power shaft.
- m. Continue to slide the power shaft to the left until it is free of the left-hand power shaft bearing.
- n. Remove the retaining screws in the power shifter yoke (1).
- o. Loosen the power shaft bearing adjusting screws (4) in the two power shaft bearing yokes (3). Remove the right-hand power shaft bearing and the left-hand power shaft bearing with friction disk shifter links (22) attached.
- p. Loosen the setscrews in the yoke support sockets and lift out the power shaft bearing yokes.
- q. Detach the shifter yoke spring (2) from the arm of the shifter yoke.
- r. Remove the setscrew in the power shifter yoke and remove the yoke from the power treadle shaft (15). Loosen the setscrew and remove the power treadle shaft collar (14) from the power treadle shaft.
- s. Moving to front of the stand, remove the presserfoot treadle rod pin (9) from the connecting yoke of the presserfoot treadle (10).
- t. Loosen the setscrew in the presserfoot treadle and remove the presserfoot treadle lever pivot pin (11).
- u. Remove the screws in the presserfoot treadle bearing (12), and remove the bearing from the stand base.
- v. Loosen the setscrew in the power foot treadle (18) and remove the treadle from the power treadle shaft.

54. Adjustment

Whenever possible, adjustments should be made without disassembling the stand assembly.

a. **POWER SHAFT BEARING ALIGNMENT.** The bearings should cradle the power shaft snugly without binding. If the shaft binds in the bearings, loosen the power shaft bearing adjusting screw in the yoke supporting each of the two bearings. When both bearings are loose, but supported in their yokes, turn the power shaft by hand. When the



Ref. No.	Vendor's part No.	Nomenclature
1	K32-7A	Power shifter yoke.
2	K32-707	Shifter yoke spring.
3	K32-4	Power shaft bearing yoke.
4	K32-305	Power shaft bearing adjusting screw.
5	K32-5	Power shaft bearing.
6	K32-903	Thrust bearing.
7	K32-103	Short set collar.
8	K32-403	Power shaft.
9	K32-530	Presserfoot treadle rod pin.
10	K32-28	Presserfoot treadle.
11	K32-528	Presserfoot treadle lever pivot pin.
12	K32-29	Presserfoot treadle bearing.
13	K32-604A	Power shaft bearing fiber washer.
14	K32-107	Power treadle shaft collar.
15	K32-407	Power treadle shaft.
16	K32-1	Stand base.
17	K32-611A	Power belt wheel releasing arm.
18	K32-8	Power foot treadle.
19	K32-6B	Power friction pulley.
20	K32-11A	Power belt wheel.
21	K32-10	Power friction disk.
22	K32-9	Friction disk shifter link.

Figure 39. Stand assembly.

bearings have roughly aligned themselves to the turning shaft, set one bearing in what appears to be its true position, and tighten the adjustment screw in the yoke. Then turn the power shaft by hand and align the loose bearings with the secured bearing at the point where the shaft does not bind. Tighten the adjusting screw in the yoke.

b. POWER FRICTION PULLEY ALIGNMENT. The friction pad of the power belt wheel should engage the power friction pulley easily and smoothly. The power belt wheel should be fully engaged when the power treadle has been pressed to its lowest point. When the power treadle is free, there should be about $\frac{3}{4}$ inch space between the friction pad of the power belt wheel and the power friction pulley.

c. DRIVE SHAFT DRIVE PULLEY ALIGNMENT. The drive shaft drive pulley should be aligned with the pulley of the electric motor so that the V-belt will ride smoothly in the pulley without rubbing across the rims of the pulley. The power shaft bearing fiber washer should be set snugly against the left side of the power shaft bearing, so that end play in the power shaft will not disturb the alignment of the pulleys on the shaft.

55. Assembly (fig. 39)

a. Slip the power foot treadle (18, fig. 39) onto the power treadle shaft (15), turn the needle to the proper position on the shaft, and tighten the setscrew.

b. Place the screws in the presserfoot treadle bearing (12) and attach the bearing to the stand base.

c. Place the presserfoot treadle (10) in position in the treadle bearing. Pass the presserfoot treadle lever pivot pin (11) through the bearing and treadle, and secure the setscrew in the treadle.

d. Raise the presserfoot treadle until the connecting yoke of the treadle joins the hole in the end of the presserfoot treadle connecting rod. Insert the presserfoot treadle rod pin (9) and secure it with the cotter pins.

e. Moving to the rear of the stand, place the power treadle shaft collar (14) in position on the power treadle shaft and secure the setscrew.

f. Place the power shifter yoke (1) in position on the power treadle shaft and secure the setscrew.

g. Attach the shifter yoke spring (2) to the arm of the power shifter yoke.

h. Place the power shaft bearing yokes (3) in

the yoke support sockets and tighten the setscrews.

i. Place the power shaft bearing with the friction disk shifter links (22) attached into the left-hand power shaft bearing yoke. Secure the bearing-adjusting screws (4). Place the other power shaft bearing in the right-hand bearing yoke, and secure the bearing-adjusting screws.

j. Place the friction disk shifter links in position on the power shifter yoke (1) and secure the links with the retaining screws.

k. Slide the power shaft (8) from the left into the left-hand power shaft bearing until the right end of the power shaft is free between the two power shaft bearings.

l. Slide the drive shaft drive pulley onto the right end of power shaft. Place the power shaft bearing fiber washer (13) alongside of the drive pulley on the shaft.

m. Slide the power shaft to the right until it passes through the right-hand power shaft bearing.

n. Place the power friction disk (21) on the left end of the power shaft. Slide the power belt wheel (20) on the power shaft and against the friction disk.

o. Place the power friction pulley (19) on the left end of the power shaft. Slide it up to within about $\frac{3}{4}$ inch of the power belt wheel.

p. Set the two power belt wheel releasing arms (17) in place over the flange of the power belt wheel and fasten the retaining screws.

q. Align the power friction pulley (19) on the power belt wheel and secure the setscrews in the power friction pulley.

r. Slide the power shaft bearing fiber washer (13) to the right until it is snug against the left side of the right-hand power shaft bearing (5). Secure the setscrews.

s. Align the drive shaft drive pulley with the pulley of the motor (not shown). Secure the setscrew.

t. Place the thrust bearing (6) on the right end of the power shaft (8), and slide it to left until it is snug against the right side of the right-hand power shaft bearing (5).

u. Place the short set collar (7) on the right end of the power shaft and push it up snugly against the thrust bearing. Secure the setscrew.

v. Reinstall the belts to the motor pulley, hand-wheel, and bobbin winder.

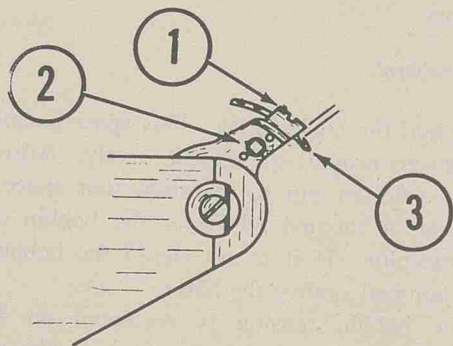
Section XIV. HEAD ASSEMBLY

56. Description

For detailed description of head assembly, see paragraph 72. The head assembly (fig. 54) is built around four cams spaced on a camshaft which runs through the width of the stitcher head. The cams, turning with the camshaft, activate the working parts of the head. Coordination of many working parts within the compact stitcher head requires very accurate timing and fine adjustment. Disassembly and assembly of the stitcher head are authorized for third and higher echelons only. The close interrelation of parts in the stitcher head makes it difficult to remove complete subassemblies without partial or total disassembly of the head assembly. Therefore, the maintenance instructions included in this section apply only to the adjustments and minor replacements authorized the unit mechanic of the using organizations.

57. Needle Guide Adjustment

a. The needle guide is set properly when it just touches the needle segment when the needle segment is as far forward as it can go.



Ref. No.	Nomenclature
1	Needle guide.
2	Needle guide fastening screw.
3	Needle barb.

Figure 40. Needle guide correctly positioned.

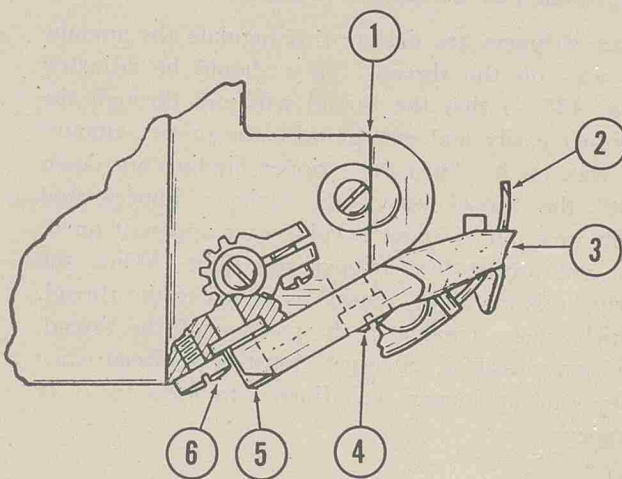
b. The needle guide (1, fig. 40) is changed after the needle has been removed. Move the guide into its most forward position, where it is closest to the work table. Remove the needle guide fastening screw (2, fig. 40) with the wrench furnished for that purpose. (See 2, fig. 5.) Replace worn or broken dowel pins. Leave the machine in that position and install the new needle guide in the position from which the old guide was removed. Set the

guide as described in a above. Secure the needle guide fastening screw.

58. Needle Plate (Work Table) Adjustment (fig. 41)

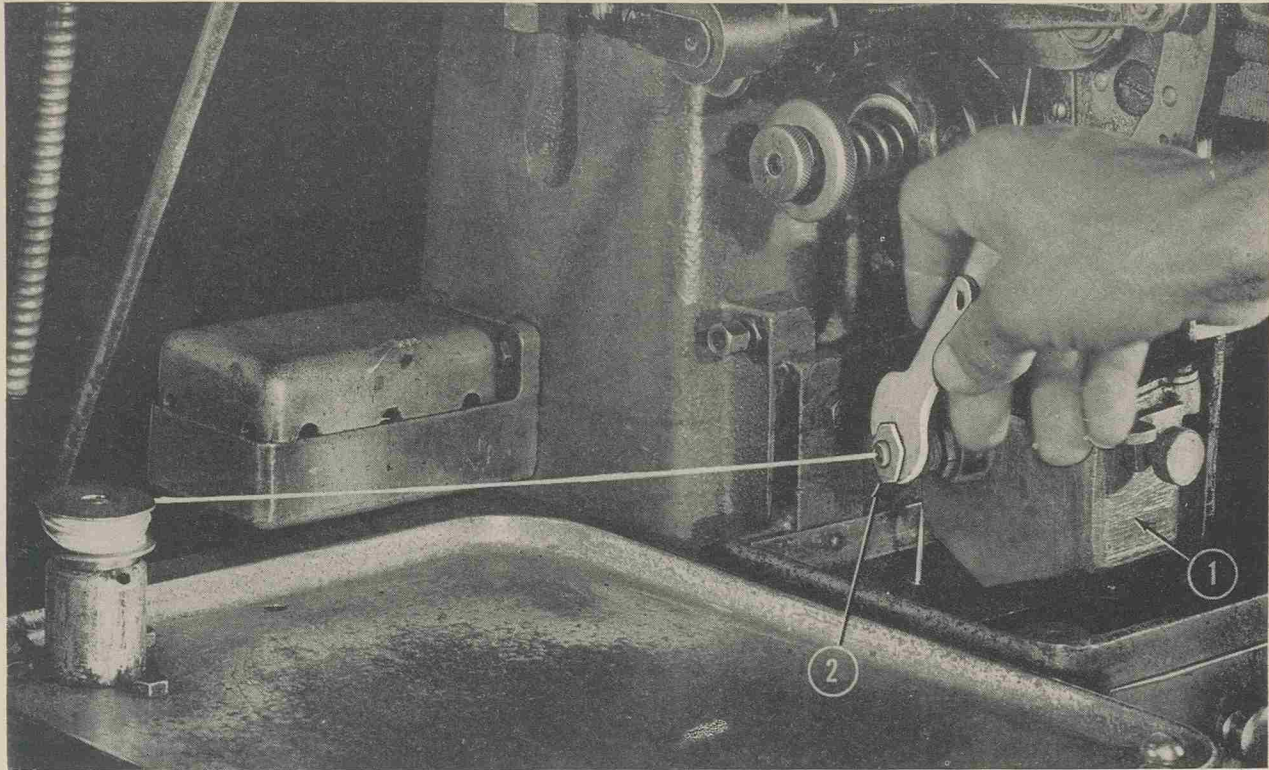
a. There is no adjustment of the needle plate on Landis stitchers.

b. On American stitchers the needle plate (3, fig. 41) is set so that it nearly touches the awl and supports the awl while it is piercing the work. (See fig. 41.) To set the needle plate, release needle plate fastening screw (4), then tighten it until it holds the shank of the plate flat against the shuttle head (1). Release the eccentric dowel clamp screw (6). Turn the handwheel of the stitcher so that the point of the awl (2) is about $\frac{1}{2}$ inch above plate. Turn the eccentric dowel (5) right and left to move the front of the plate to and from the awl. Set the eccentric so that the front wall of the slot just touches the awl, then turn the eccentric back slightly until a little play can be felt between the awl and the needle plate. Tighten the binding screw (6) and plate-fastening screw (4). If the plate is set correctly, the awl can be sprung forward slightly with a finger to touch the needle plate. The needle plate must not be set so close to the awl that it will spring the awl in. If it is set too close, the awl will catch the needle plate as the awl moves back from the needle.



Ref. No.	Nomenclature
1	Shuttle head.
2	Awl.
3	Needle plate.
4	Needle plate fastening screw.
5	Needle plate eccentric dowel.
6	Eccentric dowel clamp screw.

Figure 41. Needle plate adjustment.



Ref. No.	Nomenclature
1	Wax pot.
2	Wax pot stripper binding nut.

Figure 42. Wax pot stripper adjustment.

59. Wax Pot Stripper Adjustment

Wax strippers are designed to regulate the amount of wax on the thread. They should be adjusted (fig. 42) so that the thread will pull through the stripper easily and emerge with the proper amount of wax on it. Turn the stripper binding nut down until the thread leaves the stripper impregnated with wax, but without surplus wax apparent on it. Do not adjust the stripper too tight. When the stripper is too tight, tension is added to the thread, which causes trouble in the passage of the thread, and may break it. Strippers must be replaced when they can no longer be adjusted to strip the wax properly.

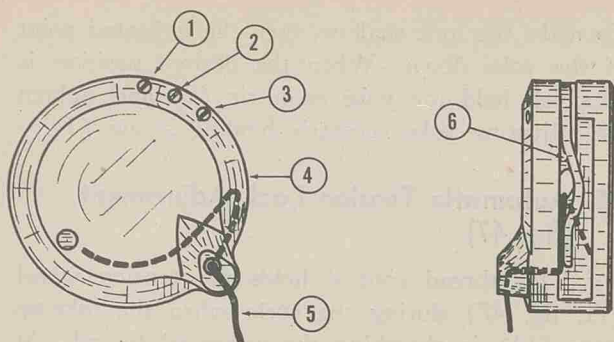
60. Bobbin Case Adjustment (fig. 43)

a. The bobbin case is retained by the latch at the top of the door. The fulcrum pin for the latch is an eccentric retained by a small setscrew on the inside of the door. The bobbin retainer should be set so that there is about 1/32 inch between the

retainer and the bobbin case. This space permits the thread to go around the shuttle freely. Adjust the eccentric fulcrum pin to maintain that space. The door must be latched whenever the bobbin case is in the machine. If it is not closed the bobbin case will be jammed against the lifter.

b. The bobbin tension is regulated on Landis stitchers by turning the tension cam on the side of the bobbin case. To increase the tension, tighten the tension cam. To decrease the tension, loosen the tension cam. If the tension should suddenly increase when applied tension is normal, it is caused by either burned thread or old wax gummed in the bobbin case. Clean and oil the bobbin case often.

c. The bobbin tension is regulated on American stitchers by two screws mounted on the face of the bobbin case. (See 4, fig. 43.) The fastening screw (1, fig. 42), should be kept tight, and is not moved in adjusting the bobbin tension. To increase the tension, back off the abutment screw (2). Tighten the lock screw (3) to draw the bobbin case spring (6) in. Lock this position by tightening the abut-



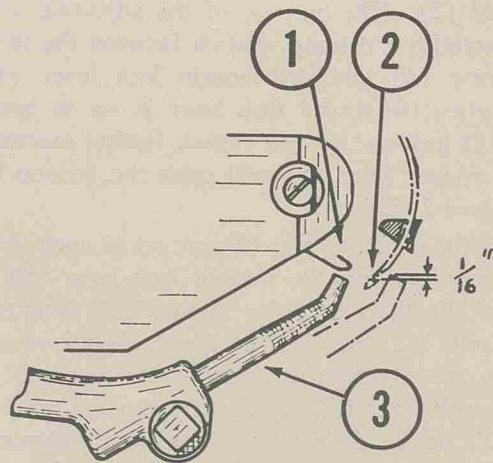
Ref. No.	Nomenclature
1	Bobbin case thread tension adjusting screw (long).
2	Bobbin case thread tension adjusting screw (short).
3	Bobbin case thread tension lock screw (long).
4	Bobbin case.
5	Thread.
6	Bobbin case spring.

Figure 43. Bobbin case adjustment.

ment screw (2). To decrease the tension, loosen the lock screw (3). Force the bobbin case spring (6) out by tightening the abutment screw (2). Lock this position by tightening the lock screw (3).

61. Loper and Loper Cam Adjustment (fig. 44)

a. The looper must lay the thread into the barb of the needle. (See 2, fig. 44.) There must be clearance for the thread when the looper (3) passes under the thread hook (1). In passing in front of the



Ref. No.	Nomenclature
1	Thread hook.
2	Needle barb.
3	Looper.

Figure 44. Loper adjustment.

needle, the looper should carry the thread $1/16$ inch higher than the barb of the needle. On heavy work it is advisable to have the looper set farther forward to allow for springing of the needle. Sharp edges and burs on the looper or improper setting of the looper may cause skipped stitches or stranding. When setting the looper, set the stitch control for the smallest stitch, then check to see that the looper does not strike the awl as the looper passes on its return.

b. The fact that the looper cannot be set properly is an indication that the cams which control the looper movement have been moved. Those cams (cams Nos. two and three) should be set $15/16$ inches apart. Cam No. two should be set so that it will clear the side of the thread hook by $3/64$ of an inch.

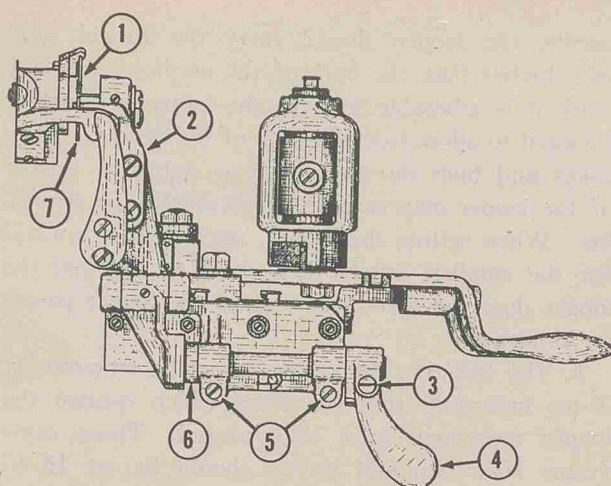
62. Shoe Guide (Edge Gauge) Adjustment (fig. 45)

a. The shoe guide shifting lever works between two stop points. The forward position of the hand lever is the forward position of the shoe guide. The forward position of the shoe guide may be set so that the guide will clear the awl, or it may be set to suit the average work requirement. When this forward position has been established, the operator may move the guide back, temporarily, to get greater clearance, but he can always return it to the forward stop without guessing at the position, and without danger of throwing the guide into the path of the awl.

b. To adjust the forward position of the shoe guide (2, fig. 45), loosen the shifter lever clamp screw (3). Hold the shifter lever (4) in forward position. To bring the shoe guide to the desired position, turn the shoe guide adjusting shaft (6) with the pin wrench (11, fig. 6) in the hole provided for adjustment. Then tighten the shifter lever clamp screw (3). The shoe guide adjusting shaft clamp screws (5) may be adjusted and locked with the jam nuts at the rear to produce the required tension.

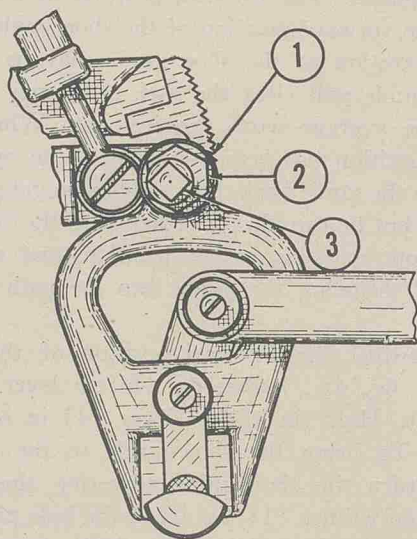
63. Thread Measure and Lock Adjustment (fig. 46)

a. The thread-measuring mechanism measures the thread required to form the stitch. Working with the tension, the thread measure controls the depth of the thread lock. When properly set (fig. 46), it should not be tampered with. The thread lock should



Ref. No.	Nomenclature
1	Needle.
2	Shoe guide.
3	Shoe guide shifter lever clamp screw.
4	Shoe guide shifter lever.
5	Shoe guide adjusting lever clamp screws.
6	Shoe guide adjusting shaft.
7	Awl.

Figure 45. Shoe guide adjustment.



Ref. No.	Nomenclature
1	Measuring point.
2	Adjusting yoke eccentric.
3	Adjusting yoke eccentric binding screw.

Figure 46. Thread measure and lock adjustment.

not be pulled in more than one-half the thickness of the outsole.

b. To adjust the thread measurer, loosen the adjusting yoke eccentric binding screw. (See 3, fig. 46.) To deepen the lock, turn the measuring point (1) of the adjusting yoke eccentric (2) up.

To make the lock shallow, turn the indicated point of the yoke down. When the desired position is obtained, hold the yoke eccentric (2) and tighten the adjusting yoke eccentric binding screw (3).

64. Automatic Tension Lock Adjustment (fig. 47)

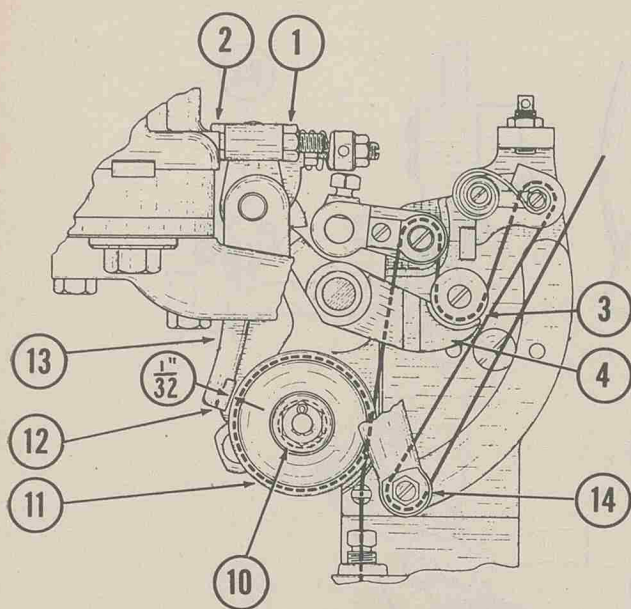
a. This thread control holds the tension wheel (11, fig. 47) during the cycle when the take-up lever (14) is absorbing the measured thread. At that time the thread lock (3) is open. When the thread measurer is pulling the thread, the thread lock is closed and the thread lock (12) is open, leaving the tension wheel under moderate tension of the spring (10).

b. The adjustment of the automatic tension lock is closely connected with the thread lock mechanism. The adjustment to open the thread lock lever (4) is made, as described in paragraph 65, by setting the nuts (1) and (2) to open the thread lock lever a full $1/32$ inch with the thread around the lock roll. When the thread lock lever closes, the lock rocker lever (5) continues to move. It compresses the swivel connection spring (6) and should open the tension lock lever (13) about $1/32$ inch to release the tension wheel. This action occurs just before the take up lever reaches its lowest position, going down.

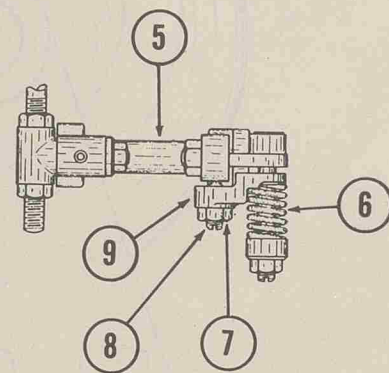
c. The adjusting screw (8) and lock nut (7) are set at the factory and need no adjustment in the field, since all field adjustment is made with nuts (1) and (2). The purpose of the adjusting screw is to establish a definite relation between the thread lock lever (4) and the tension lock lever (13). Thus when the thread lock lever is set to open a full $1/32$ inch and is then closed, further movement of the rocker lever (5) will open the tension lock lever about $1/32$ inch.

d. If the nuts (1) and (2) are set to open thread lock lever too far, the tension lock lever will not release. Furthermore, the thread lock lever may not clamp the thread. Therefore, should occasion arise to reset adjusting screw (8), first see that thread lock lever is properly set with the nuts (1) and (2) before disturbing any other adjustment.

e. The tension wheel spring (10) is adjusted so that there is very moderate tension on the thread. The tension lock applies additional heavy tension to prevent stealing thread. When both the thread lock and the tension lock are open, the thread should pull freely.



Ref. No.	Nomenclature
1	Swivel connection adjusting nut.
2	Swivel connection adjusting nut.
3	Thread lock.
4	Thread lock lever.
5	Lock release rocker shaft.
6	Swivel connection spring.
7	Tension lock lever adjusting screw nut.



Ref. No.	Nomenclature
8	Tension lock lever adjusting screw.
9	Thread tension wheel lock lever.
10	Thread tension wheel spring.
11	Tension wheel.
12	Thread lock.
13	Thread tension wheel lock lever.
14	Auxiliary take-up lever.

Figure 47. Automatic tension lock adjustment.

65. Thread Lock Adjustment (fig. 48)

a. The take-up lever (5, fig. 48) must be in the lowest position when adjusting the rear thread lock (7). With the take-up in the lowest position, the rear lock should be open $\frac{1}{32}$ inch to $\frac{3}{64}$ inch in order to release the thread. This release can be varied by adjusting the nuts (1) and (2). To increase the opening, release nut No. 1 about one-quarter turn, then tighten nut No. 2. To decrease the opening, release nut No. 2 and tighten nut No. 1. When it is properly set, tighten the nuts securely. When the rear lock (7) is open the front lock (3) will be closed.

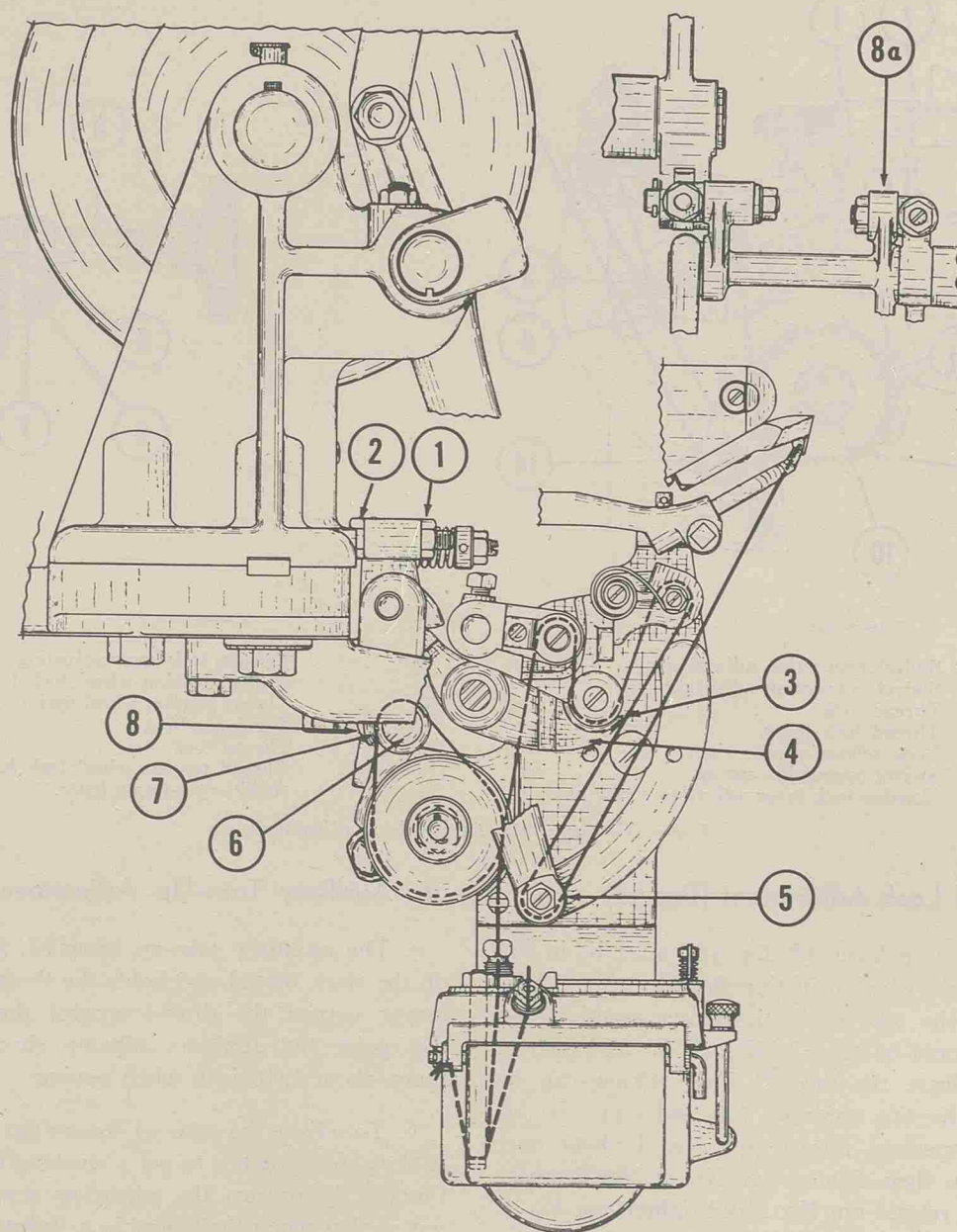
b. After adjusting nuts No. 1 and No. 2 to open the rear lock, turn the stitcher handwheel to open the front lock (3). Step on the presserfoot treadle. The rear lock should open. If the lock does not open, the adjustment of nuts No. 1 and No. 2 is not correct. In that case, adjust the nuts so that the rear lock will open enough to release the thread when stepping on the presserfoot treadle.

66. Auxiliary Take-Up Adjustment (fig. 49)

a. The auxiliary take-up lever (7, fig. 49) takes up the slack thread and holds the thread taut as the looper carries the thread around the needle. At this point the auxiliary take-up should be pulled down about $\frac{1}{16}$ inch when sewing.

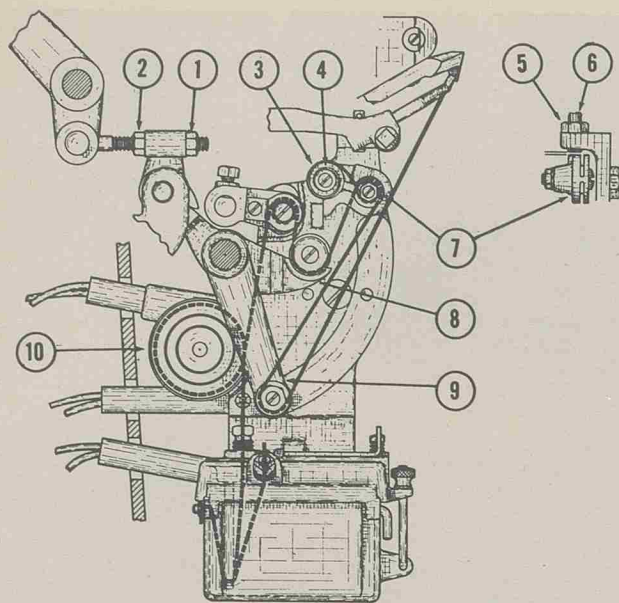
b. To adjust the take-up, loosen the lock nut (5). Make a few stitches to get a working tension on the thread. Then turn the adjusting screw (6) in or out so that when the looper is in front of the needle there will be a $\frac{1}{16}$ -inch space between the adjusting screw (6) and the auxiliary take-up (7).

c. When the auxiliary take-up is not functioning, thread-stranding is likely to occur. The auxiliary take-up spring should hold the free thread and the take-up lever against the adjusting screw (6). If the spring is too weak, loosen the retaining collar screw (4) and compress the spring (3) by turning it to the left with fingers. Then tighten the retaining collar screw (4).



Ref. No.	Nomenclature
1	Swivel connection adjusting nut.
2	Swivel connection adjusting nut.
3	Front thread lock.
4	Thread lock lever.
5	Take-up lever.
6	Rear thread lock roll.
7	Rear thread lock.
8	Lock release rocker shaft.
8a	Lock release rocker shaft.

Figure 48. Thread lock adjustment.



Ref. No.	Nomenclature
1	Swivel connection adjusting nut.
2	Swivel connection adjusting nut.
3	Auxiliary take-up lever spring.
4	Spring-retaining collar screw.
5	Auxiliary take-up lever adjusting screw nut.
6	Auxiliary take-up lever adjusting screw.
7	Auxiliary take-up lever.
8	Thread lock lever.
9	Take-up lever.
10	Thread tension wheel.

Figure 49. Auxiliary take-up adjustment.

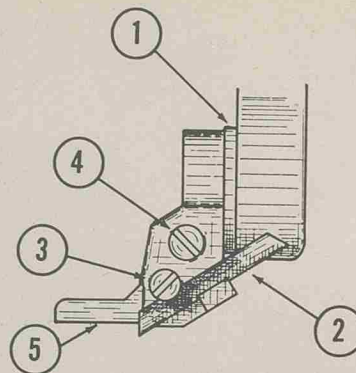
67. Presserfoot and Channel Cutter Adjustment (fig. 50)

a. The channel presserfoot (fig. 50) is provided with a channel cutter (2), a clamp screw (4), and an adjusting screw (3). To remove the channel cutter, or to adjust it for depth, release the clamp screw (4). To adjust the channel cutter in or out, turn the adjusting screw in or out to the required position.

b. When the longest stitches to be made are not more than six per inch, a shim may be used between the presserfoot lever and the presserfoot clamping surface in order to bring the channel cutter closer to the awl. This arrangement also supports the work better.

Caution: It is important to remember that a shim may not be used if stitches are to be longer than six per inch. If larger stitches are taken with the shim in place, the awl will jam.

c. As of 15 January 1945, the American channel presserfoot part No. B-6-7 assembled has been discontinued. From that date the channel presser-



Ref. No.	Nomenclature
1	Channel cutting presserfoot shim.
2	Channel knife.
3	Channel knife adjusting screw.
4	Channel knife clamp screw.
5	Presserfoot.

Figure 50. Channel presserfoot.

foot Landis part No. 25-5L assembled will be furnished for both American and Landis stitchers. Adjustment of the Landis presserfoot is similar to that discussed in the instructions described above. However, the channel knife, clamp, and clamp screw must be removed from the presserfoot before the adjusting screw is accessible.

Section XV. MOTOR

68. Description

The motor is a ½-horsepower, single-phase, 1,750-r.p.m., 115 to 230-volt electric motor operated by means of a Cutler-Hammer switch with thermal overload protection. (See fig. 51.) In the salvage repair trailer, this motor runs off a 220-volt line. (See TM 9-1825A.)

69. Maintenance

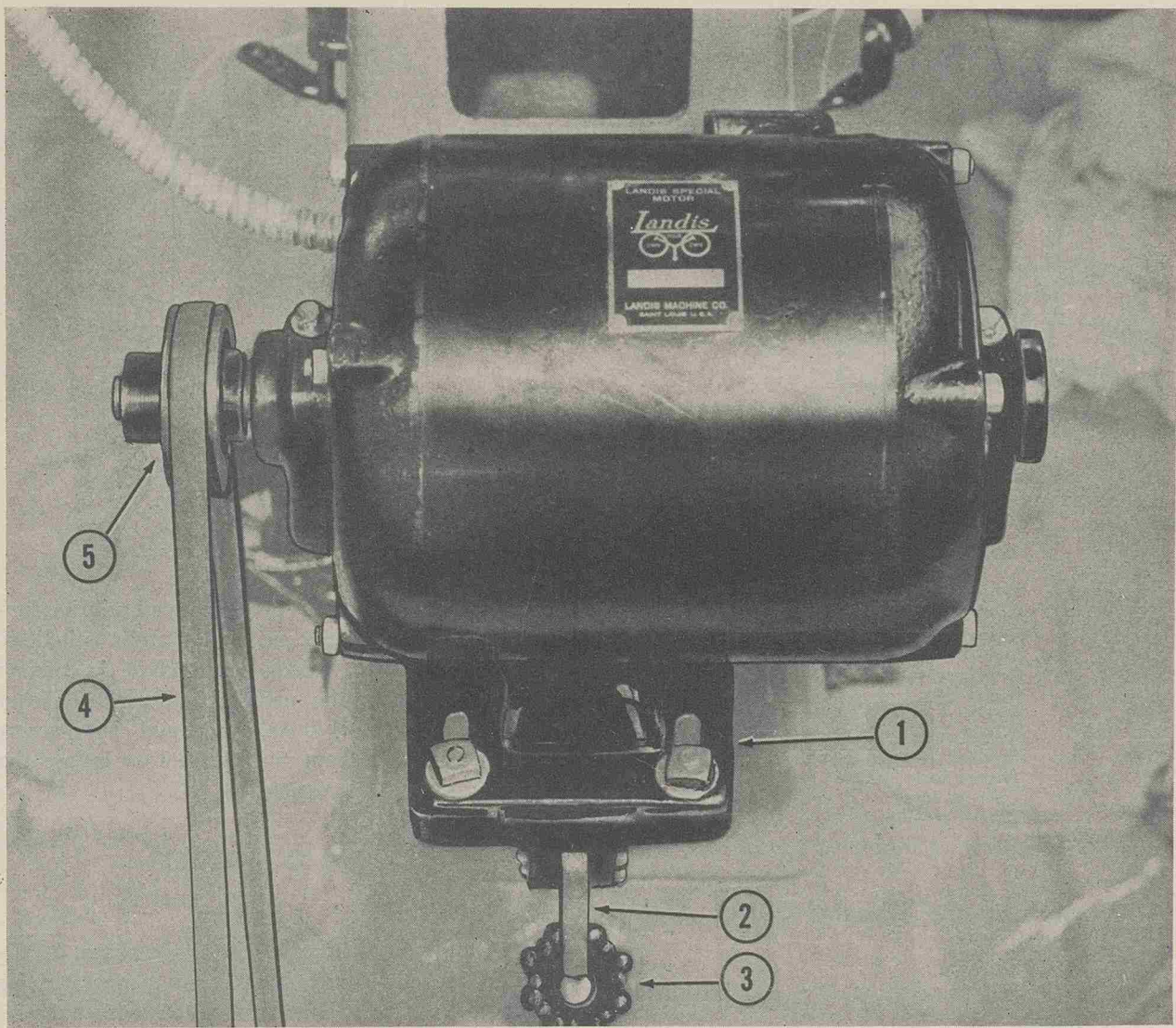
a. Lubricate the motor according to instructions prescribed in paragraph 45.

b. Keep the motor housing and the external parts of the motor clean.

Section XVI. WIRING

70. Description

The wiring of the stitcher may be connected in parallel to operate at 110 volts, or in series to operate at 220 volts.

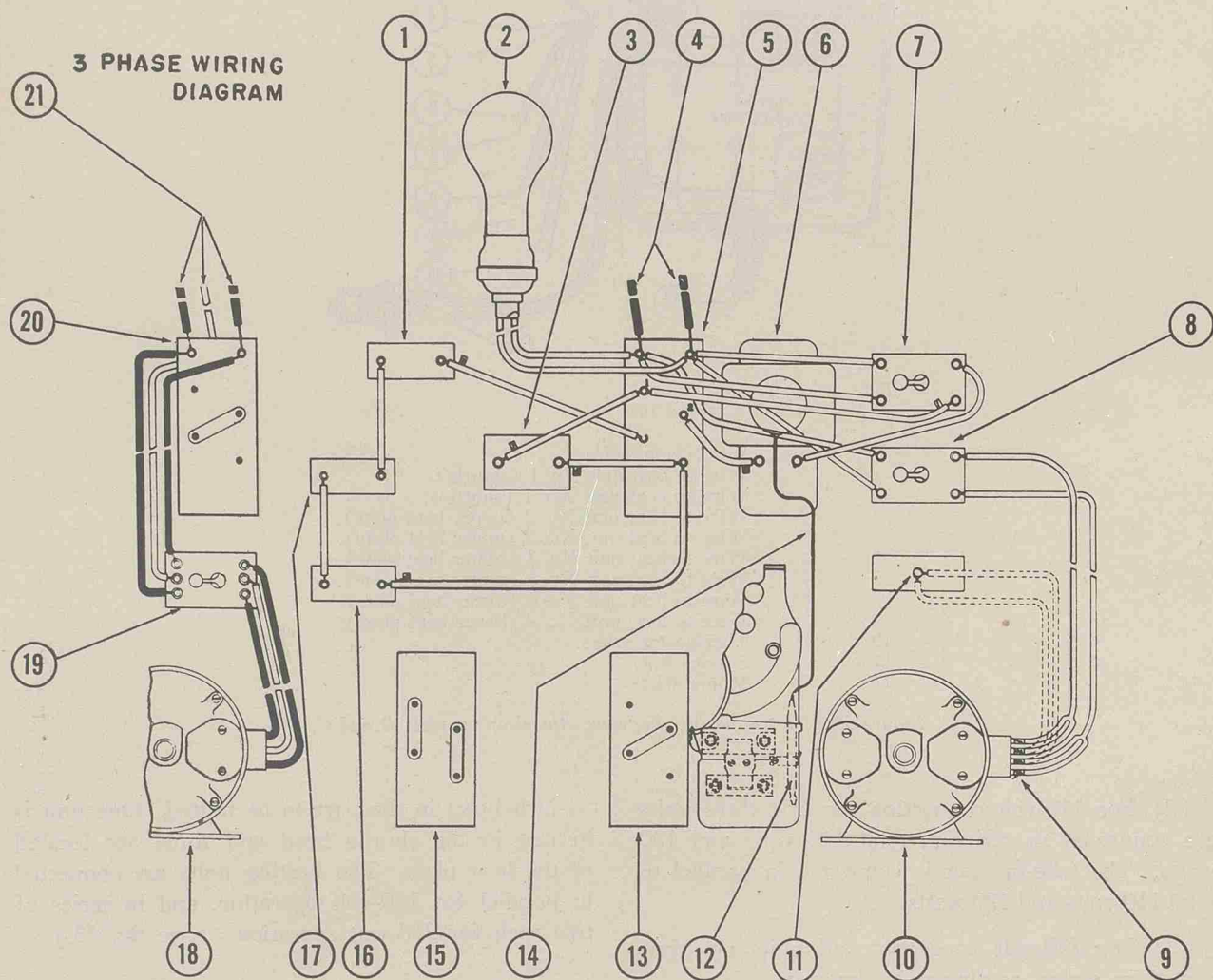


Ref. No.	Nomenclature
1	Motor bracket.
2	Motor bracket adjusting rod.
3	Motor bracket adjusting rod nut.
4	Motor drive belt.
5	Motor pulley.

Figure 51. Motor.

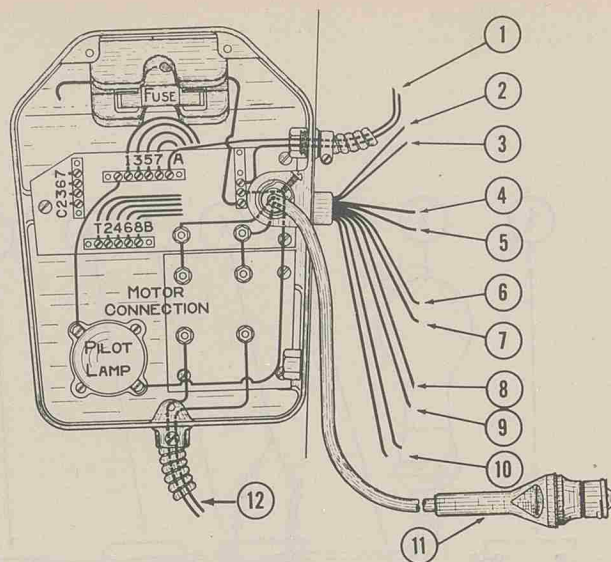
a. LANDIS No. 12 MODELS F AND K. (1) There are four conduction type heating units on these stitchers. The total heating capacity of the four elements is 260 watts. Each unit is clamped to the surface of the part to be heated. One unit is clamped on the shuttle head, one on the wax pot (heat plate), one on the take-up (heat plate), and one on the bobbin winder. Wattage and volts of the four units are as follows:

Part	Volts	Watts
Bobbin winder	8	9
Wax pot	38	45
Shuttle	64	76
Take-up	110	130



Ref. No.	Description	Ref. No.	Description
1	Shuttle heater.	12	Location of thermostat bulb.
2	Work light.	13	Terminal connection for 220 volts.
3	Take-up bracket heater.	14	Copper tubing.
4	Power lines.	15	Terminal connection for 110 volts.
5	Unit block.	16	Wax pot heater.
6	Thermostat.	17	Oven.
7	Heat switch.	18	Motor.
8	Motor switch.	19	3-phase motor switch.
9	For 110 volts, connect as shown.	20	Unit block.
10	Motor.	21	Power lines.
11	For 220-volt connection, wires No. 2 and 3 from motor to dead post.		

Figure 52. Electric wiring diagram, Landis No. 12 model K.



Ref. No.	Description
1	Work lamp wires.
2	Wire to heat unit No. 1 (shuttle).
3	Wire to heat unit No. 1 (shuttle).
4	Wire to heat unit No. 2 (upper heat plate).
5	Wire to heat unit No. 2 (upper heat plate).
6	Wire to heat unit No. 3 (center heat plate).
7	Wire to heat unit No. 3 (center heat plate).
8	Wire to heat unit No. 4 (lower heat plate).
9	Wire to heat unit No. 4 (lower heat plate).
10	Thermostat wires.
11	Service line.
12	Motor wires.

Figure 53. Electric wiring diagram, American models B and C.

(2) For 110-volt connection the first three units are connected in series to total 110 volts and 130 watts. The take-up unit is connected in parallel to total 110 volts and 130 watts.

(3) For 220-volt connection, all units are connected in series, as shown in figure 52.

b. AMERICAN MODELS B, C, AND CA. These stitchers have four 110-volt, 75-watt heating units. Total heating capacity of the four units is 300 watts. Each unit is $\frac{1}{2}$ inch in diameter and is inserted in

$\frac{1}{2}$ -inch holes in the part to be heated. One unit is located in the shuttle head and three are located in the heat plate. The heating units are connected in parallel for 110-volt operation, and in series of two each for 220-volt operation. (See fig. 53.)

71. Maintenance

The unit mechanic will make visual inspection of wiring and connections. The connections should be solid and clean. The wiring should be clean with all insulation intact.

PART FOUR AUXILIARY EQUIPMENT

(There are no attachments, parts, or subassemblies on this machine that may be classified as auxiliary equipment. The components of the stitcher are

integral parts. Therefore, part four does not apply to this machine.)

PART FIVE

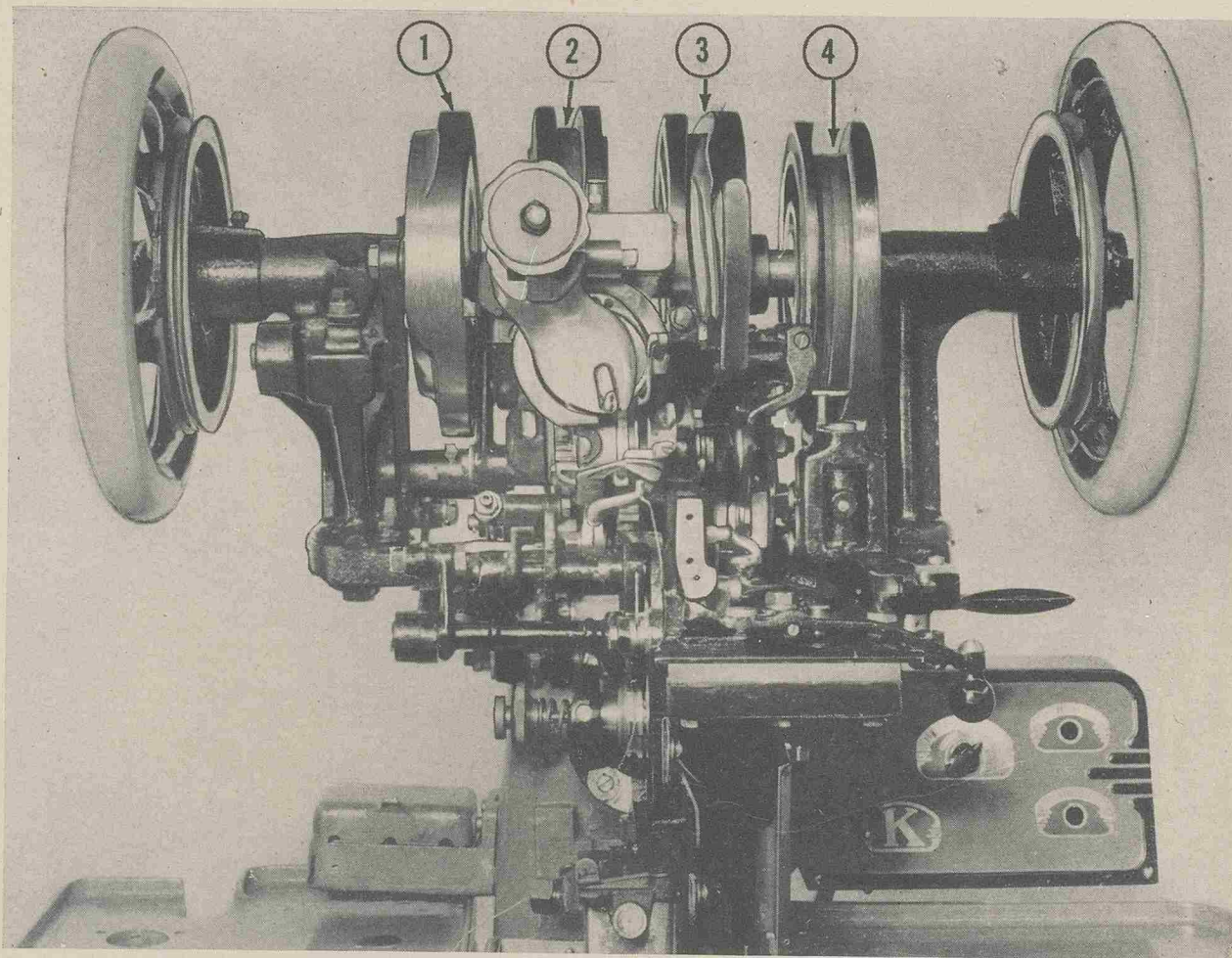
REPAIR INSTRUCTIONS

Section XVII. HEAD ASSEMBLY

72. Description

The head assembly of the stitcher is built around the four cams spaced on the camshaft which runs through the width of the head. The cams are numbered from the left: Nos. 1, 2, 3, and 4. (See fig.

54.) They turn with the camshaft as it is driven by the power drive belt. Eccentric channels (cam races) are machined in the sides and rim of the cams. Rollers attached to the cam levers run in the cam races. As the cams turn, the cam rollers follow the course of the cam races and impart a controlled motion to the cam levers. The cam levers directly



Ref. No.	Vendor's part No.	Nomenclature
1	K23-1	Take-up, thread lock, and needle guide cam (number 1).
2	K23-2	Shuttle, needle, thread hook, and looper cam (number 2).
3	K23-3	Awl, presserfoot, thread lifter, and looper cam (number 3).
4	K23-4	Feed and thread measure cam (number 4).

Figure 54. Head assembly.

activate the functional parts of the head. These parts are numerous, and their operation must be carefully timed and closely adjusted. For that reason, the mechanic must have a thorough knowledge of the machine before he attempts the complete disassembly and assembly of the stitcher head assembly. The instructions included in this section will enable the mechanic to disassemble the head and assemble it. However, the proper functioning of the head when it is assembled depends upon the care with which the mechanic establishes the correct relationship between the parts as he replaces them into the assembly.

Note. The stitcher head may be disassembled by a mechanic of a third or higher echelon installation if he understands its assembly. Special disassembly instructions have, therefore, been omitted.

73. Assembly

a. The head is assembled as follows:

(1) Insert thread lock and tension release lever (fig. 55), as shown at H, figure 60 with key up and pointing slightly to rear.



Figure 55. Thread lock and tension release lever (K28-17).

(2) Place presserfoot to lock release shaft lever (fig. 56) on end of thread lock and tension release lever so that end with one hole points to rear.

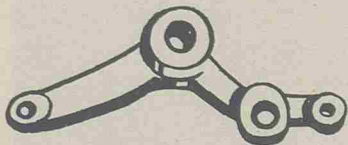


Figure 56. Presserfoot to lock shaft lever (K27-21).

(3) Tighten setscrew.

(4) Attach auxiliary take-up bracket (1, fig. 57) as at F, figure 60. Insert binding screw (2, fig. 57) and tighten firmly.

(5) Remove nut (2, fig. 58) from end of thread tension stud (1) and insert end of stud as at G, figure 60.

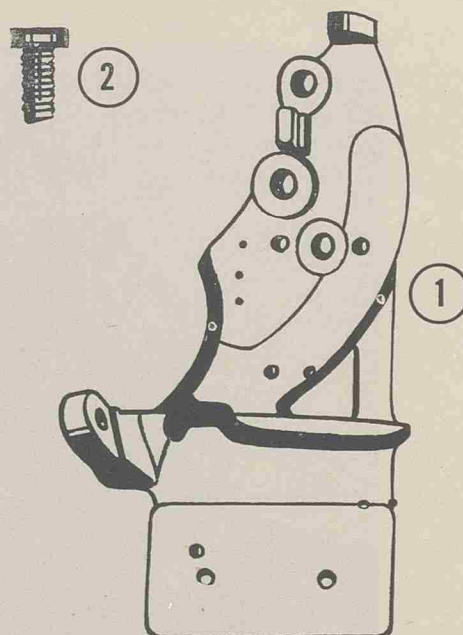
(6) Replace nut (2, fig. 58) on end extended through head base. Tighten nut firmly.

(7) Insert thread tension release yoke connecting stud. (See 3, fig. 58.) Tighten firmly.

(8) Remove space washer and nut from stud for head. (See 1, fig. 59.)

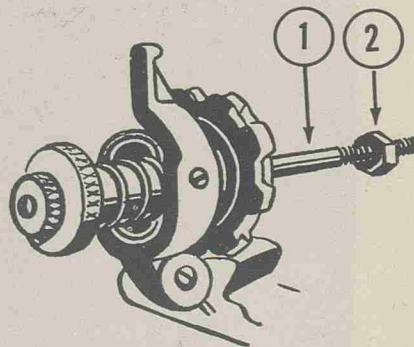
(9) Place head (3, fig. 59) as at J, figure 60, and insert stud for head. (See 1, fig. 59.) Tap head lightly for flush fitting, using stud to assure alignment.

(10) Place stud for head nut on end of stud and tighten firmly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-16N	Auxiliary take-up bracket.
2		Binding screw.

Figure 57. Auxiliary take-up bracket assembly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-212	Thread tension stud.
2	K28-312	Thread tension stud nut.
3	K28-218	Thread tension release yoke connecting stud.

Figure 58. Thread tension stud—assembly.

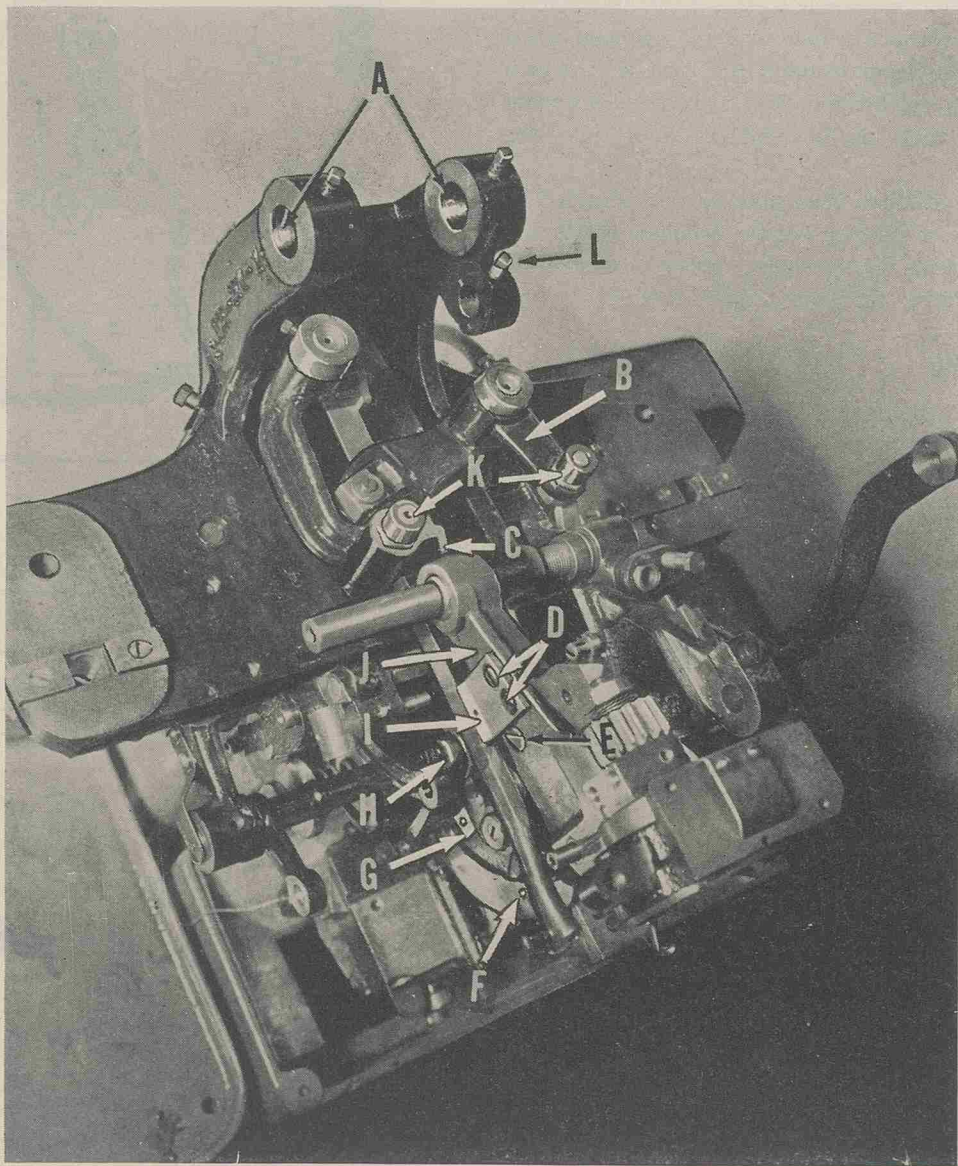
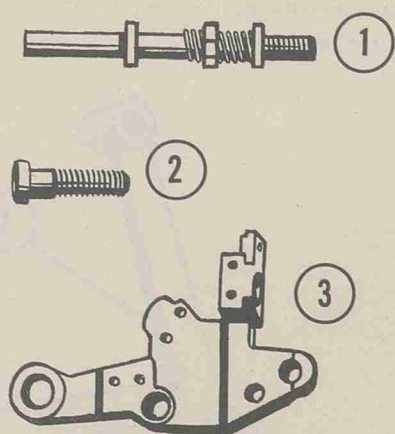


Figure 60.



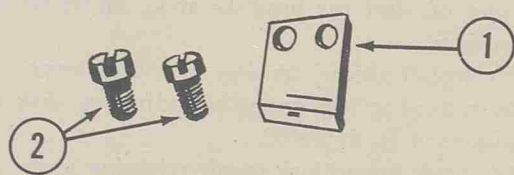
Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K22-201	Stud for head.
2	K22-301	Screw for head.
3	K22-1N	Head.

Figure 59. Head Assembly.

(11) Place space washer on end of stud for head after nut.

(12) Insert screw for head (2, fig. 59) in head as shown at E, figure 60, and tighten firmly.

(13) Place looper bar guide (1, fig. 61) as shown at I, figure 60.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K29-4A	Looper bar guide.
2	K29-304A	Looper bar guide retaining screws.

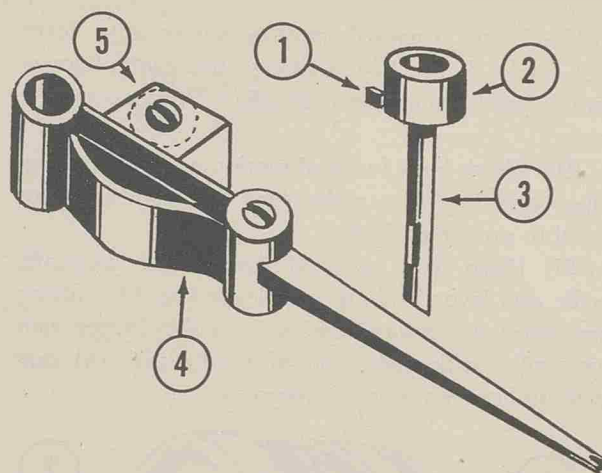
Figure 61. Looper bar guide assembly.

(14) Insert retaining screws (2, fig. 61) and tighten firmly as shown at D, figure 60.

(15) Place side motion looper cam lever (4, fig. 62) as at C, figure 60.

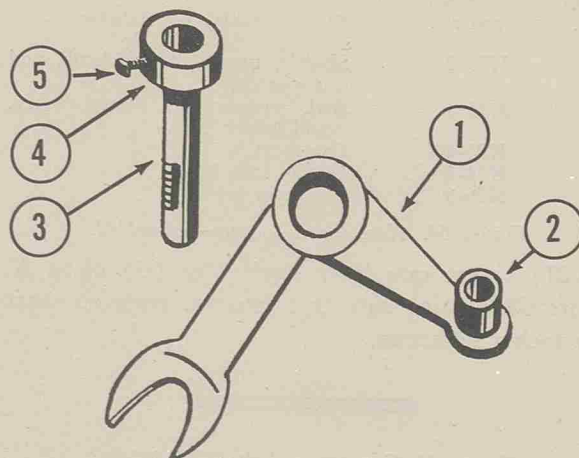
(16) Insert side motion looper cam lever pivot stud (3, fig. 62), making sure that setscrew seat on stud is facing setscrew (1). Tighten setscrew firmly.

(17) Place forward motion looper cam lever (1, figure 63) as at B, figure 60, making sure that fork is fitted on looper cam lever slide block.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K29-302	Side motion looper cam lever pivot stud set screw.
2	K29-102	Side motion looper cam lever pivot stud collar.
3	K29-202	Side motion looper cam lever pivot stud.
4	K29-2	Side motion looper cam lever slide block.
5	K29-101B	Side motion looper cam lever slide block.

Figure 62. Side motion looper cam lever—assembly.



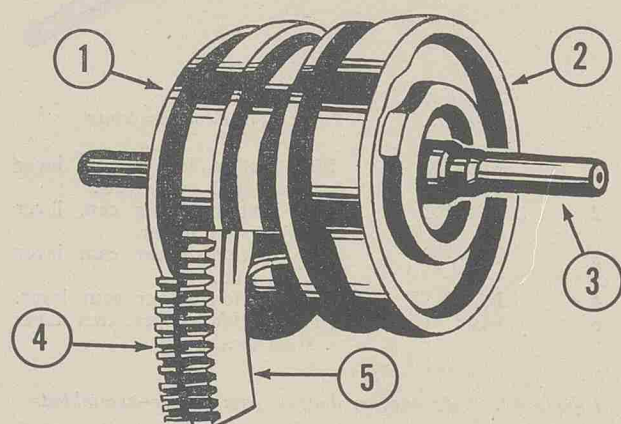
Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K29-1	Forward motion looper cam lever
2	K29-201A	Forward motion looper cam lever roll stud.
3	K29-201	Forward motion looper cam lever pivot stud.
4	K29-101	Forward motion looper cam lever pivot stud collar.
5	K29-301	Forward motion looper cam lever pivot stud set screw.

Figure 63. Forward motion looper cam lever assembly.

(18) Insert forward motion looper cam lever pivot stud (3, fig. 63), making sure that setscrew seat on stud is facing setscrew (5). Tighten setscrew firmly.

(19) Check both forward motion and side motion looper cam levers to make sure that cam rolls are placed in proper position.

(20) Place Nos. two and three cams, camshaft, needle cam lever, and awl cam lever (fig. 64), fitting cam races on forward and side motion looper cam lever rolls, with pivot end of needle and awl cam levers in between, as at K, figure 60.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K23-2	Shuttle, needle, thread hook, and looper cam.
2	K23-3	Awl, presserfoot, thread lifter, and looper cam.
3	K23-401	Camshaft.
4	K24-1	Needle cam lever.
5	K26-9	Awl cam lever.

Figure 64. Nos. 2 and 3 cams—assembled.

(21) Insert cam lever shaft (fig. 65) as at A, figure 60, making sure that setscrew seats on shaft are facing setscrews.

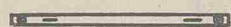


Figure 65. Cam lever shaft (K23-401A).

(22) Place shuttle cam lever (fig. 66) as shown at A, figure 68.

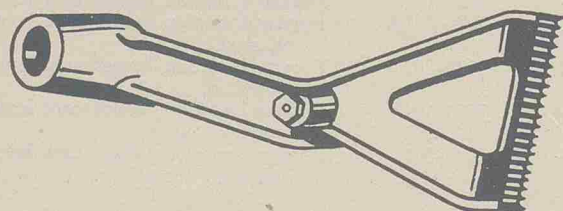
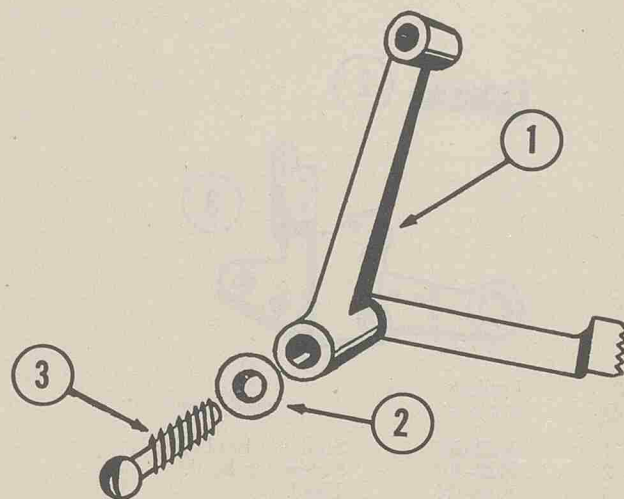


Figure 66. Shuttle cam lever (K25-1).

(23) Place needle guide cam lever (1, fig. 67) as at B, figure 68.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K24-4	Needle guide cam lever.
2	K24-104A	Needle guide cam lever retaining washer.
3	K24-304A	Needle guide cam lever retaining washer screw.

Figure 67. Needle guide cam lever assembly.

(24) Place washer on retaining screw and insert it at end of stud for head as at C, figure 68 and tighten firmly.

(25) Install thread tension lock cam lever (fig. 69) by removing tension spring adjusting disk and lock disk as at D, figure 68.

(26) Start thread lock toggle-releasing lever over end of thread lock and tension release lever as at E, figure 68 and insert end of thread lock rocker shaft.

(27) Tighten setscrew holding the thread lock toggle-releasing lever.

(28) Install tension spring adjusting disk and lock disk, as shown at D, figure 68.

(29) Place thread lock lever (fig. 70) as at F, figure 68 with back end fitted in fork of thread lock rocker shaft.

(30) Install cam No. one on left end of camshaft, making sure that needle guide cam lever roll is placed into inside cam roll race nearest the shaft, and that thread lock cam lever roll is placed into outside cam roll race farthest from shaft.

(31) Place presserfoot unlocking lever (fig. 71) on thread measure slide block lever pivot stud (2, fig. 72.)

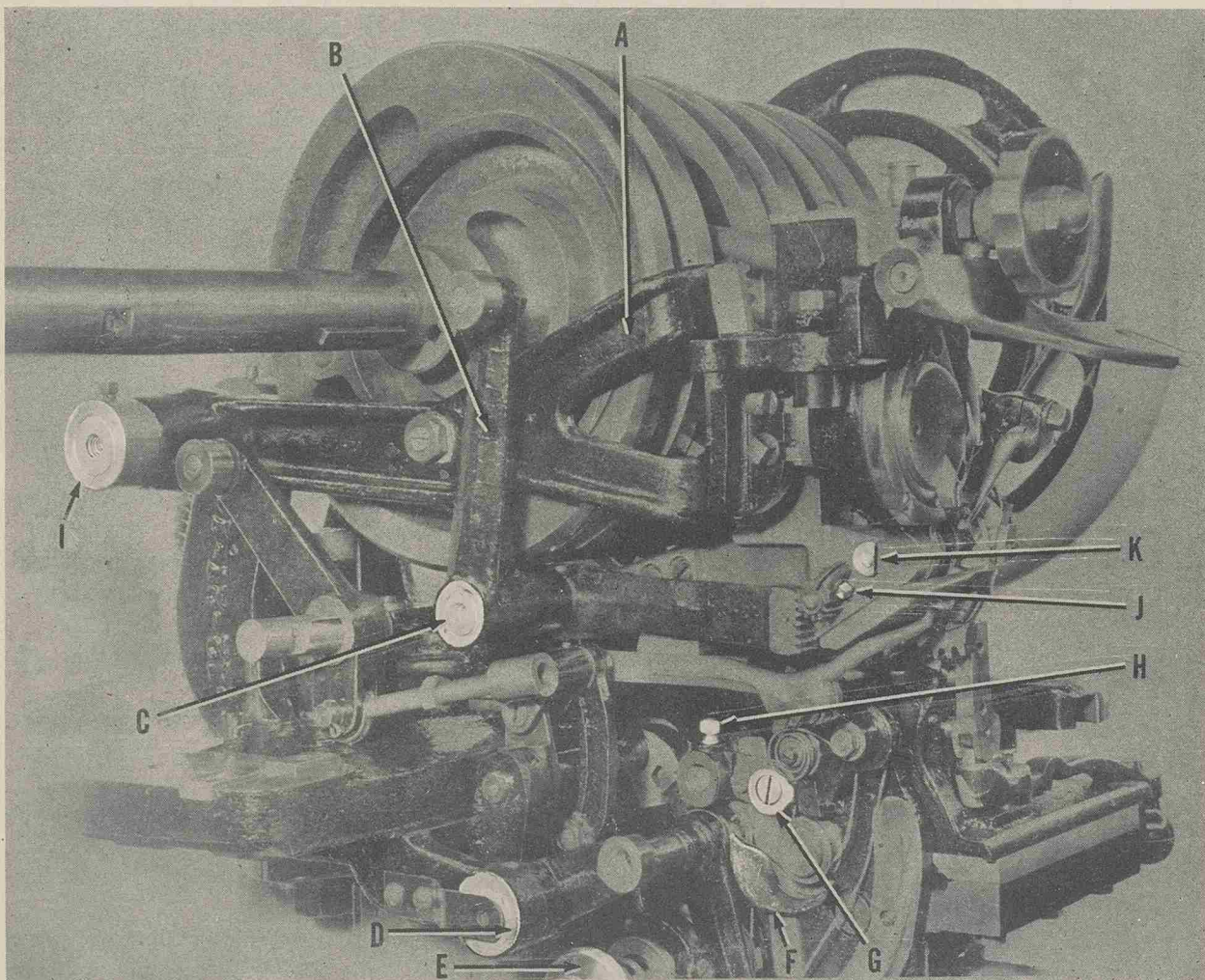
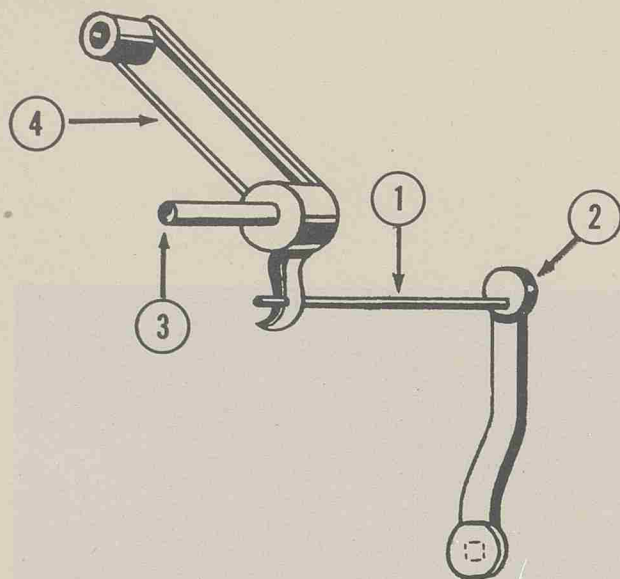


Figure 68.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-8	Thread lock rocker shaft swivel connection.
2	K28-20	Thread lock toggle lever link.
3	K28-207A	Thread lock cam lever pivot stud.
4	K28-2	Take-up cam lever connection.

Figure 69. Thread tension lock cam lever—assembly.



Figure 70. Thread lock lever (K28-11).

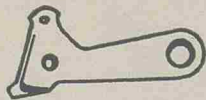
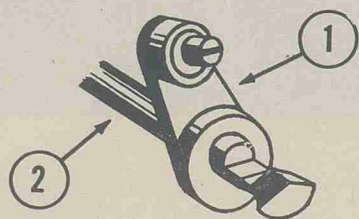


Figure 71. Presserfoot unlocking lever (K27-606).



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-17	Thread measure slide block lever.
2	K27-217A	Thread measure slide block lever pivot stud.

Figure 72. Thread measure slide block lever pivot stud—assembly.

(32) Insert end of stub at A, figure 73 making, sure that highest point of presserfoot unlocking lever is facing front of machine as shown at B,

figure 73.

(33) Place thread measure thread roll lever (see fig. 74) as shown at G, figure 68.

(34) Tighten setscrew at H, figure 68, making sure it rests on setscrew seat on pivot stud.

(35) Install left-hand camshaft column (fig. 75) as at A, figure 79, making sure that key seat on thread lock cam lever pivot stud (3, fig. 69), as shown at B, figure 79, is facing setscrew on column.

(36) Tighten setscrew.

(37) Place take-up cam lever (fig. 77) in position as shown at B, figure 84, with cam lever roll inserted in cam race on left side of cam No. one.

(38) Insert take-up cam lever pivot stud (fig. 76) into take-up cam lever (fig. 77), with binding screw seat up.

(39) Remove binding screw at C, figure 84, so you can see that binding screw seat on pivot stud (fig. 76) is in alignment with binding screw when screw is inserted.

(40) Insert binding screw and tighten firmly.

(41) Tighten binding screw lock nut at D, figure 84.

(42) Insert longest pivot end of take-up lever (1, fig. 78) as shown at E, figure 84.

(43) Step on presserfoot foot release pedal and turn take-up lever so flat side on back will pass thread lock toggle lever link. (See 2, fig. 69.)

(44) Place take-up lever fulcrum bracket (2, fig. 80) as shown at C, figure 79.

(45) Place thread lock and tension release lever washer (1, fig. 80) as shown at F, figure 84, matching keyway.

(46) Secure thread lock and tension release lever nuts. (See 3, fig. 80.)

(47) Lock the nuts (3, fig. 80) flush with washer. (See 1, fig. 80.)

(48) Place take-up lever fulcrum bracket screw spacing collar (2, fig. 81) on long take-up lever fulcrum bracket screw (1, fig. 81) and insert screw.

(49) Secure short take-up lever fulcrum bracket screw. (See 3, fig. 81.)

(50) Tighten both screws firmly.

(51) Insert take-up cam lever connecting stud (4, fig. 81) as shown at D, figure 84.

(52) Place the nut (5, fig. 81) as shown at E, figure 84, and lock firmly.

(53) To install thread hook (fig. 82), turn cams until needle cam lever (4, fig. 64) is at its highest position.

(54) Raise left-hand camshaft column (fig. 75)

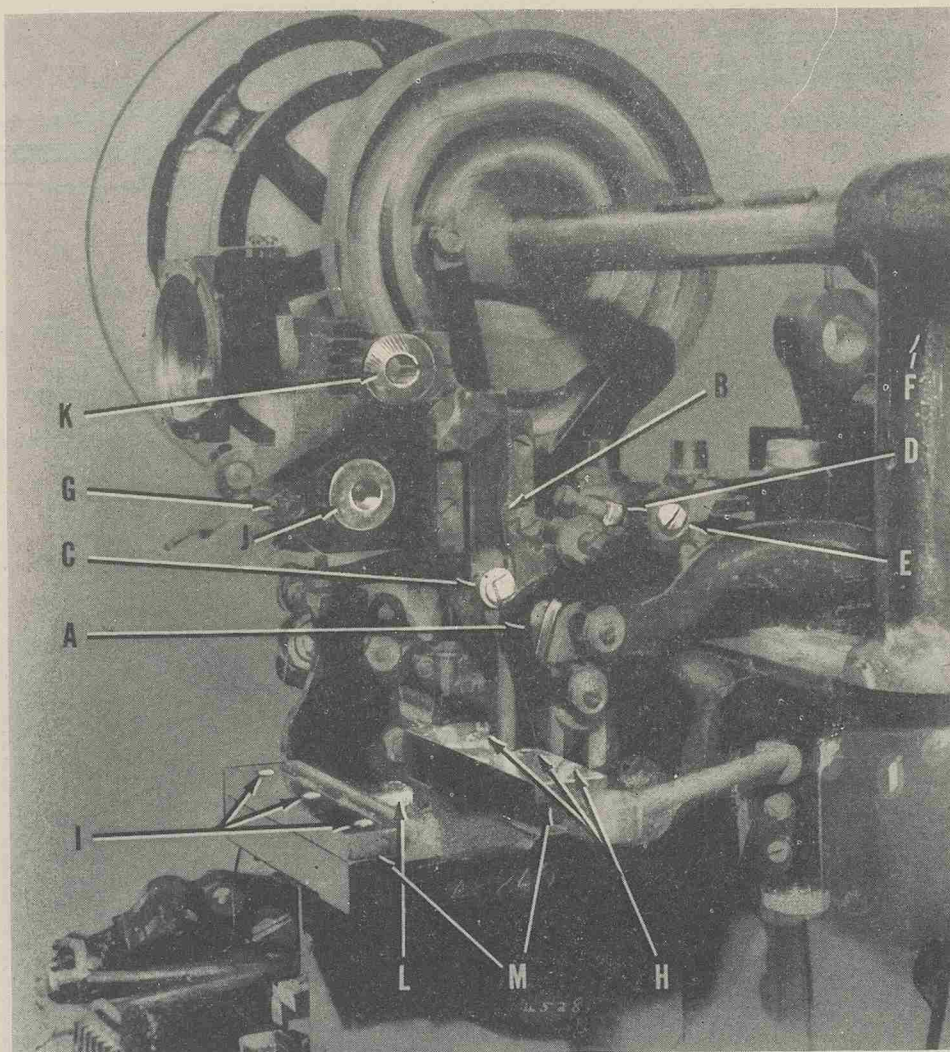
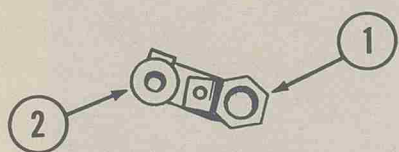


Figure 73.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-618	Thread roll lever thread roll guard.
2	K27-18	Thread measure thread roll lever.

Figure 74. Thread measure thread roll lever—assembled.

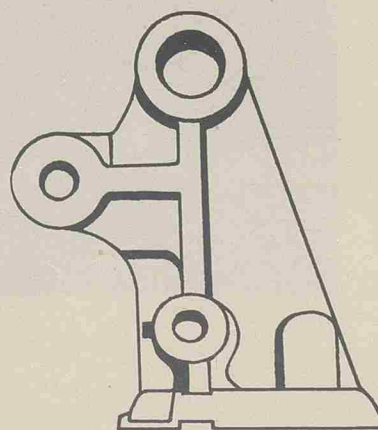


Figure 75. Left-hand camshaft column (K21-3).



Figure 76. Take-up cam lever pivot stud (K28-201A).

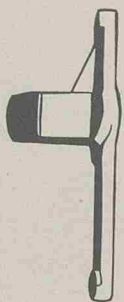
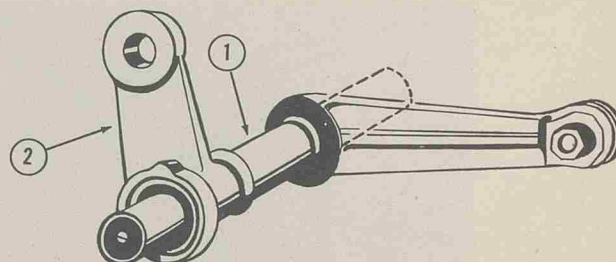


Figure 77. Take-up cam lever (K28-1).



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-3	Take-up lever.
2	K28-2	Take-up cam lever connection.

Figure 78. Take-up lever—assembly.

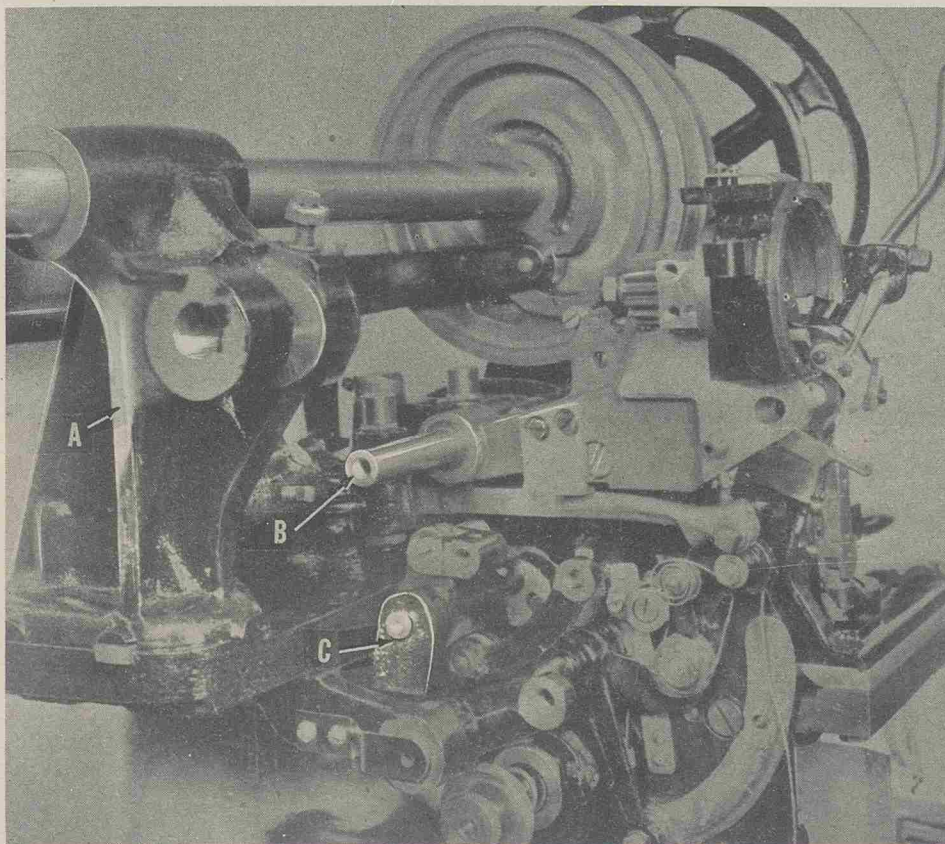
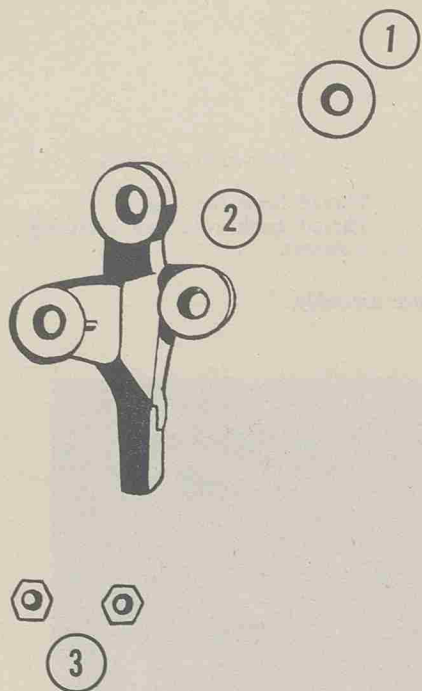


Figure 79.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-117	Thread lock and tension release lever washer.
2	K28-4	Take-up lever fulcrum bracket.
3	K28-317	Thread lock and tension release lever nuts.

Figure 80. Take-up lever fulcrum bracket assembly.

and insert screw driver between column and base.

(55) With right hand, raise right end of camshaft until needle cam lever clears thread hook race.

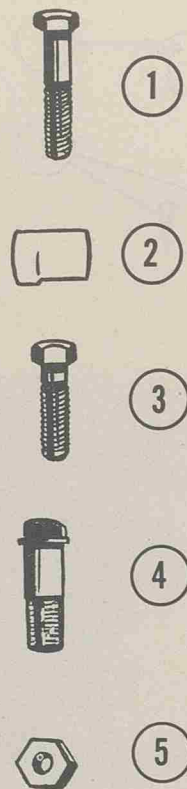
(56) With left hand, insert thread hook (assembled) into thread hook race, making sure that thread hook cam roll (2, fig. 82) is inserted in second cam race from shaft of cam No. two.

(57) Remove screw driver from under left-hand camshaft column.

(58) To install thread hook race cap (1, fig. 83), turn cams until needle cam lever is in its lowest position.

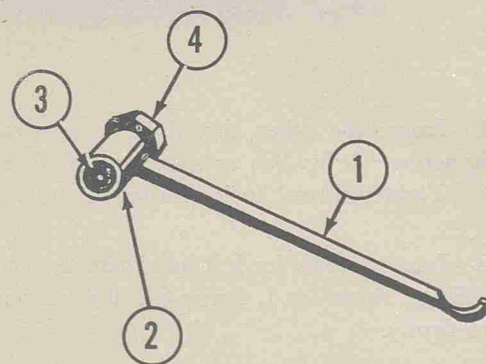
(59) Insert one thread hook race cap retaining screw (2, fig. 83) as shown at H, figure 84.

(60) Hold thread hook race cap with thumb and forefinger of right hand covering top screw hole when longest part of cap is facing front. With left hand, insert screw as at H, figure 84, into screw hole of cap. Before tightening screw firmly, turn cap toward rear of machine until the other screw hole in cap is in alignment with screw hole.



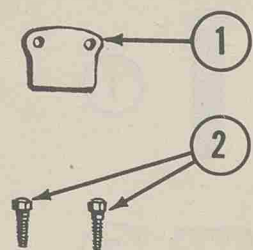
Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-304	Take-up lever fulcrum bracket screw (long).
2	K28-104A	Take-up lever fulcrum bracket screw spacing collar.
3	K28-304A	Take-up lever fulcrum bracket screw (short).
4	K28-202	Take-up cam lever connecting stud.
5	K28-302	Take-up cam lever connecting stud nut.

Figure 81. Take-up lever assembly (accessory parts).



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K29-6	Thread hook.
2	K29-106	Thread hook cam roll.
3	K29-206	Thread hook cam roll stud.
4	K29-306	Thread hook cam roll stud nut.

Figure 82. Thread hook—assembled.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K22-602B	Thread hook race cap.
2	K22-302B	Thread hook race cap retaining screws.

Figure 83. Cap for thread hook race assembly.

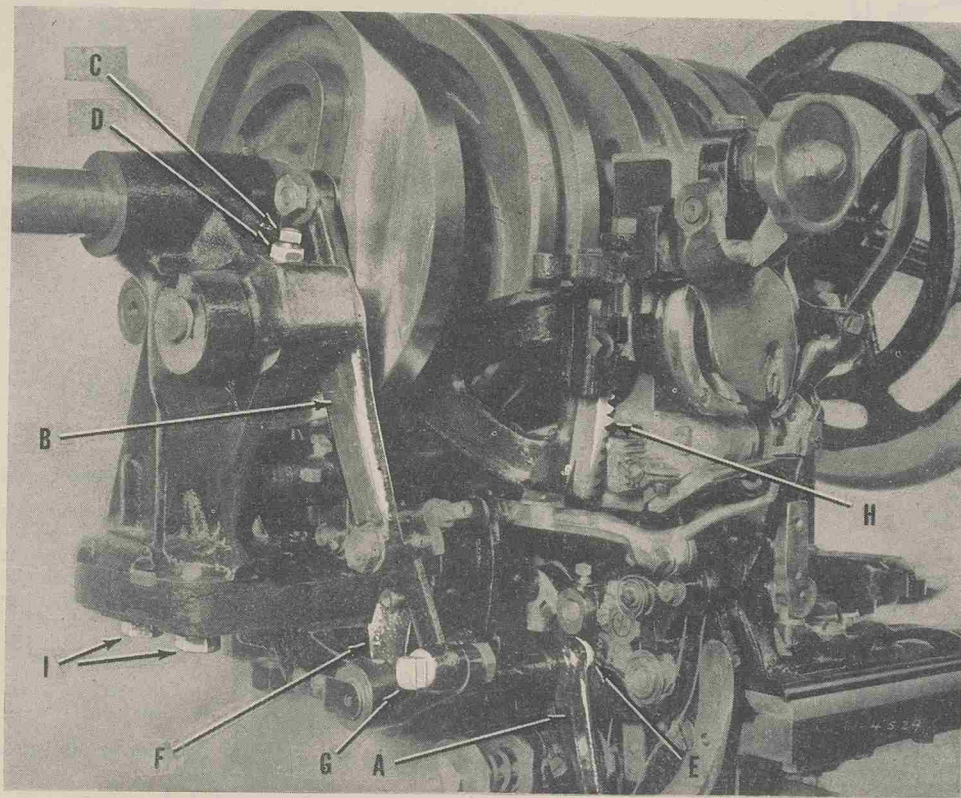


Figure 84.

(61) Insert the other thread hook race cap retaining screw (2, fig. 83) as shown at H, figure 84.

(62) Tighten thread hook race cap retaining screw firmly.

(63) Insert screws for left-hand camshaft column (fig. 85) as shown at I, figure 84, and tighten both screws firmly.



Figure 85. Screws for left-hand camshaft column (K21-303B).

(64) Insert end of presserfoot-actuating slide to

lock release link (1, fig. 86) through head base.

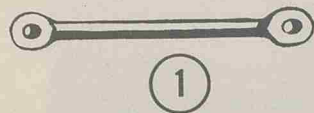
(65) Insert presserfoot-actuating slide to the lower lock release link stud. (See 3, fig. 86.) Tighten firmly and lock with lock nut.

(66) Insert presserfoot-actuating slide to upper lock release link stud (2, fig. 86) as shown at C, figure 73. Tighten firmly.

(67) Place presserfoot cam lever eccentric release lever (fig. 87) as shown at D, figure 73, making sure longest end points to rear.

(68) Install presserfoot cam lever (1, fig. 88) as shown at A, figure 89, placing cam lever roll into second cam race from shaft of cam No. three. The

eccentric roll at lower end of lever will be in its uppermost position as shown at B, figure 89.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-20	Presserfoot-actuating slide to lock release link.
2	K27-219	Presserfoot-actuating slide to lock release link stud (upper).
3	K27-219A	Presserfoot-actuating slide to lock release link stud (lower).

Figure 86. Presserfoot-actuating slide assembly.

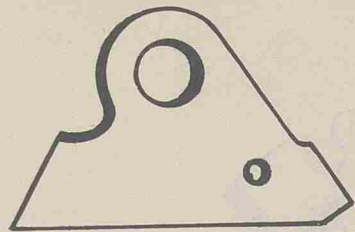


Figure 87. Presserfoot cam lever eccentric release lever (K27-606A).

(69) Insert presserfoot cam lever pivot stud (3, fig. 88) with screw seat aligned with setscrew as shown at L, figure 60. Tighten setscrew.

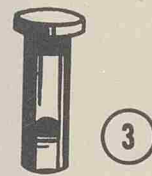
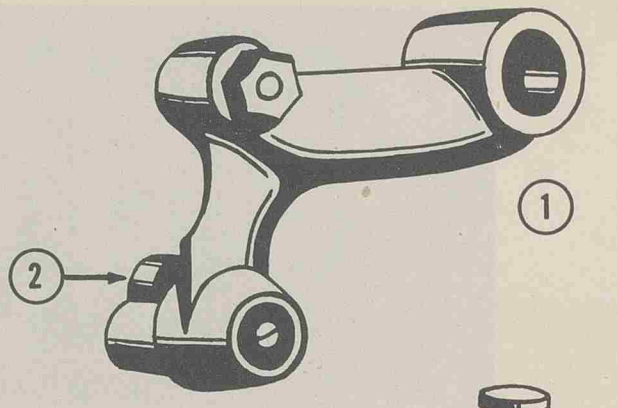
(70) Install presserfoot cam lever eccentric spring (4, fig. 88) by hooking short end of spring as shown at C, figure 89, and long end on setscrew attached to presserfoot cam lever eccentric (2, fig. 88) as shown at D, figure 89.

(71) Install thread lifter cam lever (fig. 90) by sliding pivot end over cam lever shaft (fig. 65) as in E, figure 89.

(72) Place cam roll into inside cam race nearest to shaft.

(73) Install presserfoot dog adjusting sleeve (fig. 91), checking to see that only one thread on presserfoot bar sleeve adjusting nut is exposed above presserfoot bar sleeve and adjusting nut, as shown at F, figure 89.

(74) Presserfoot bar nut (2, fig. 92) is set in



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-24	Presserfoot cam lever.
2	K27-25	Presserfoot cam lever eccentric (assembled).
3	K27-224A	Presserfoot cam lever pivot stud.
4	K27-725	Presserfoot cam lever eccentric spring.

Figure 88. Presserfoot cam lever—assembly.

hole of presserfoot bar locking dog (1) and large end of locking dog slides into assembly of presserfoot dog adjusting sleeve. (See fig. 91.)

(75) Slide the assembled sleeve over slide block lever pivot stud.

(76) Place washer (3, fig. 92) on retaining washer screw (4), then insert screw and tighten firmly as shown at E, figure 73.

(77) Place thermostat bulb (2, fig. 93) with small end up.

(78) Place thermostat bulb clamp (1, fig. 93) with curved end around center of bulb and with end of hole on dowel pin.

(79) Insert thermostat bulb clamp retaining screw (3, fig. 93) and tighten firmly.

(80) Install largest heating unit.

(81) Place smallest heating unit with lower edge resting on dowel pins.

(82) Place take-up heat unit clamp (1, fig. 94) in position so that holes in clamp are aligned with holes in plate.

(83) Insert take-up heat unit clamp screws (2, fig. 94) and tighten firmly.

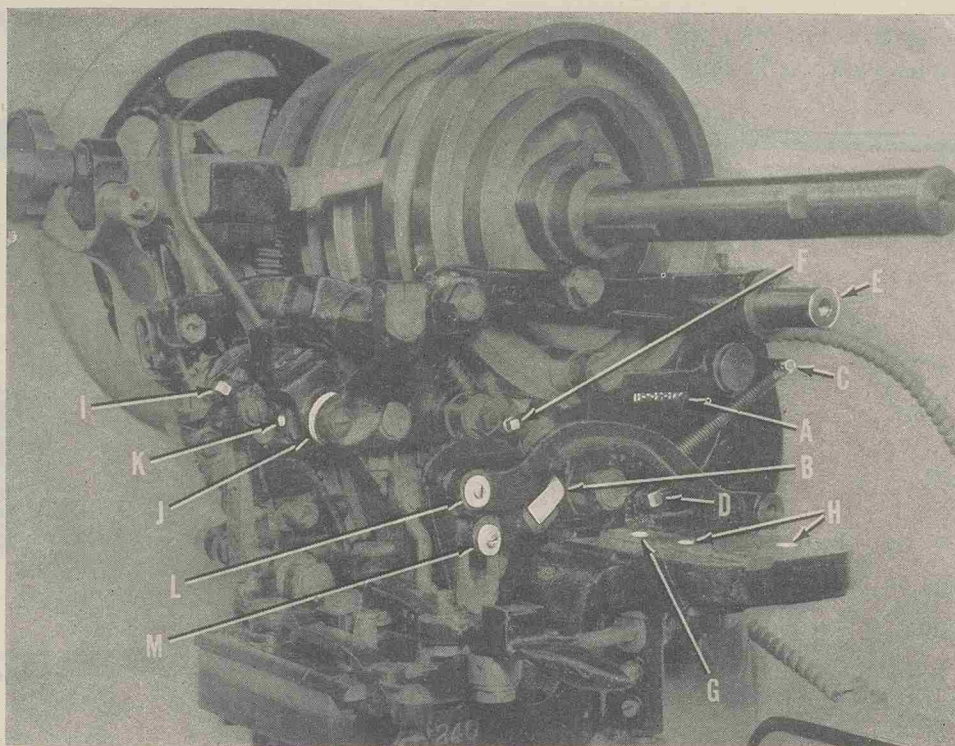


Figure 89.

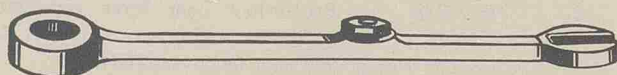


Figure 90. Thread lifter cam lever (K29-7).

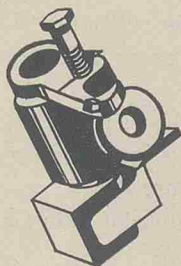
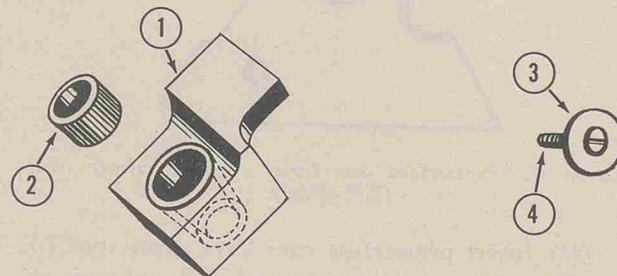


Figure 91. Presserfoot dog adjusting sleeve—assembled (K27-27).



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-26	Presserfoot bar locking dog.
2	K27-331	Presserfoot bar nut.
3	K27-130	Presserfoot bar adjusting sleeve block retaining washer.
4	K27-330	Presserfoot bar adjusting sleeve block retaining washer screw.

Figure 92. Presserfoot bar adjusting sleeve block assembly.

(84) Slide pivot end of thread measure cam lever (1, fig. 95) over end of cam lever shaft (fig. 65) as shown at E, figure 89, with cam roll to the front and facing right.

(85) Slide cam lever shaft set collar (2, fig. 95) over end of cam lever shaft as shown at E, figure 89. Collar must be flush with end of shaft and setscrew must rest on its seat on shaft.

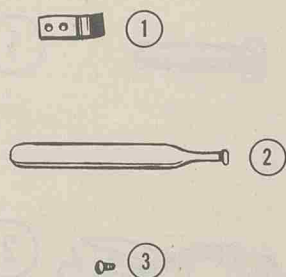
(86) Tighten setscrew (3, fig. 95) in collar.

(87) Slide cam lever shaft set collar (2, fig. 95) over left (opposite) end of cam lever shaft as shown at I, figure 68. Collar must be flush with end of shaft and setscrew must rest on its seat on shaft.

(88) Tighten setscrew (3, fig. 95) in collar.

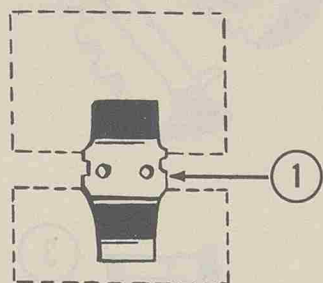
(89) Check setscrew seat alignment on shaft and tighten setscrews on cam lever bracket.

(90) Place spacing washer for cam No. four (fig. 96) on camshaft. Install cam No. four by sliding on camshaft. (See 3, fig. 64.)



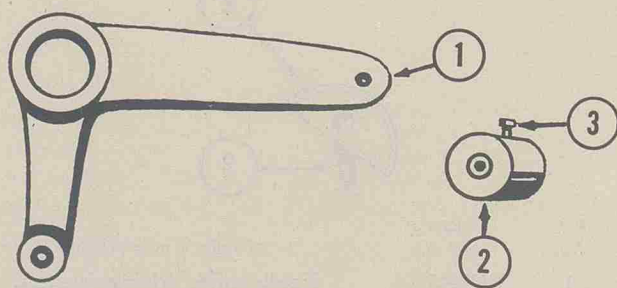
Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K31-653A	Thermostat bulb clamp.
2	K31-53	Thermostat bulb.
3	K31-353A	Thermostat bulb clamp retaining screw.

Figure 93. Thermostat bulb assembly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K28-616	Take-up heat unit clamp.
2	K28-316A	Take-up heat unit clamp screws.

Figure 94. Take-up heat unit clamp assembly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-13	Thread measure cam lever.
2	K23-101A	Thread measure cam lever shaft set collar.
3	K23-301A	Thread measure cam lever shaft collar setscrew.

Figure 95. Thread measure cam lever.

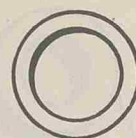


Figure 96. Spacing washer for cam No. 4 (K23-101D).

(91) Place feed cam lever bracket (1, fig. 97) on head base as shown at G, figure 89.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K26-2	Feed cam lever bracket.
2	K26-302	Feed cam lever bracket retaining screw.

Figure 97. Feed cam lever bracket assembly.

(92) Insert feed cam lever bracket retaining screw (2, fig. 97) and tighten firmly.

(93) Install right-hand camshaft column (1, fig. 98) over end of camshaft as shown in F, figure 73, with screw holes at lower end of column, and align with screw holes in head base.

(94) Insert screws for right-hand camshaft column (2, fig. 98) from underneath and tighten.

(95) Attach right-hand handwheel by sliding it over end of camshaft.

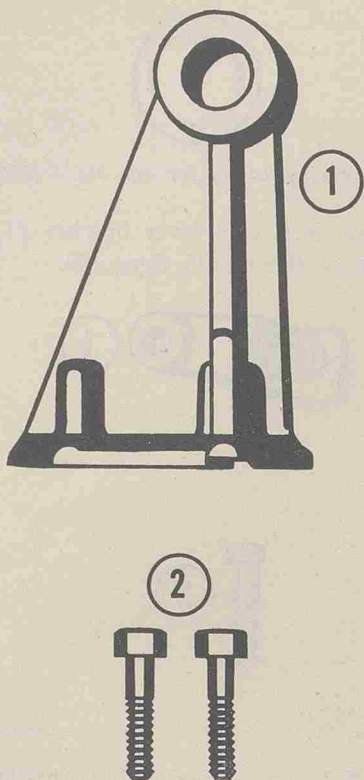
(96) Tighten setscrews and make sure that they are aligned with their screw seats on the shaft.

(97) Set cams Nos. one and two on shaft by sliding cam No. one to the left until it is flush with left-hand column. Tighten setscrews.

(98) Slide cam No. four to the right until it is flush with the right-hand column. Tighten setscrews.

(99) Turn the machine a few revolutions by hand to see that parts move freely. From this point on, after installing each successive part or assembly, turn handwheel a few revolutions in order to make certain that there is no binding of parts.

(100) Insert needle guide driving segment pinion (1, fig. 99) as shown at G, figure 73.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K21-2	Right-hand camshaft column.
2	K21-302	Right-hand camshaft column screws.

Figure 98. Right-hand camshaft column assembly.

(101) Install assembled needle segment (2, fig. 99) by turning handwheel until needle cam lever (4, fig. 64) is at its lowest position.

(102) Install assembled needle segment so that first tooth at top of needle segment will fit into the slot between first and second tooth of needle cam lever.

(103) Insert needle segment stud (3, fig. 99) as shown at I, figure 89.

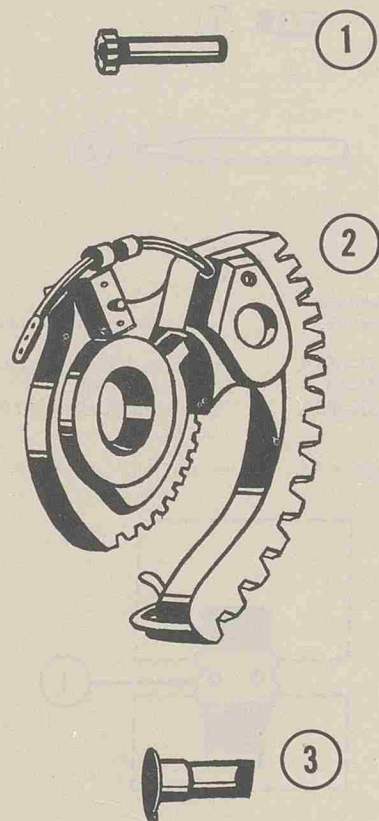
(104) Align setscrew seat with setscrew. Tighten setscrew completely, then turn it back one-quarter turn.

(105) Install needle guide driving segment (1, fig. 100) by turning handwheel until needle is at lowest position.

(106) Push needle guide up against needle segment. (See 1, fig. 100.)

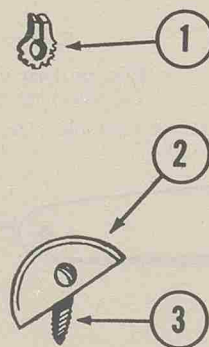
(107) Set needle guide driving segment with its binding screw in an upward position as shown at J, figure 68.

(108) Tighten binding screw as shown at J, figure 68.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K24-205	Needle guide driving segment pinion.
2	K24-2	Needle segment.
3	K24-202	Needle segment stud.

Figure 99. Needle segment—assembly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K24-5	Needle guide driving segment.
2	K24-102	Needle segment stud washer.
3	K24-302	Needle segment stud washer retaining screw.

Figure 100. Needle segment driving assembly.

(109) Slide needle segment stud washer (2, fig. 100) over needle segment stud washer retaining screw (3).

(110) Insert needle guide segment stud washer retaining screw (3, fig. 100)as shown at K, figure 68. Tighten screw firmly enough to take side play out of needle segment.

(111) Turn handwheel to make certain that

needle segment (2, fig. 99) is not too tight. If needle segment is binding, loosen retaining screw slightly and tap screw lightly.

(112) Retighten setscrew.

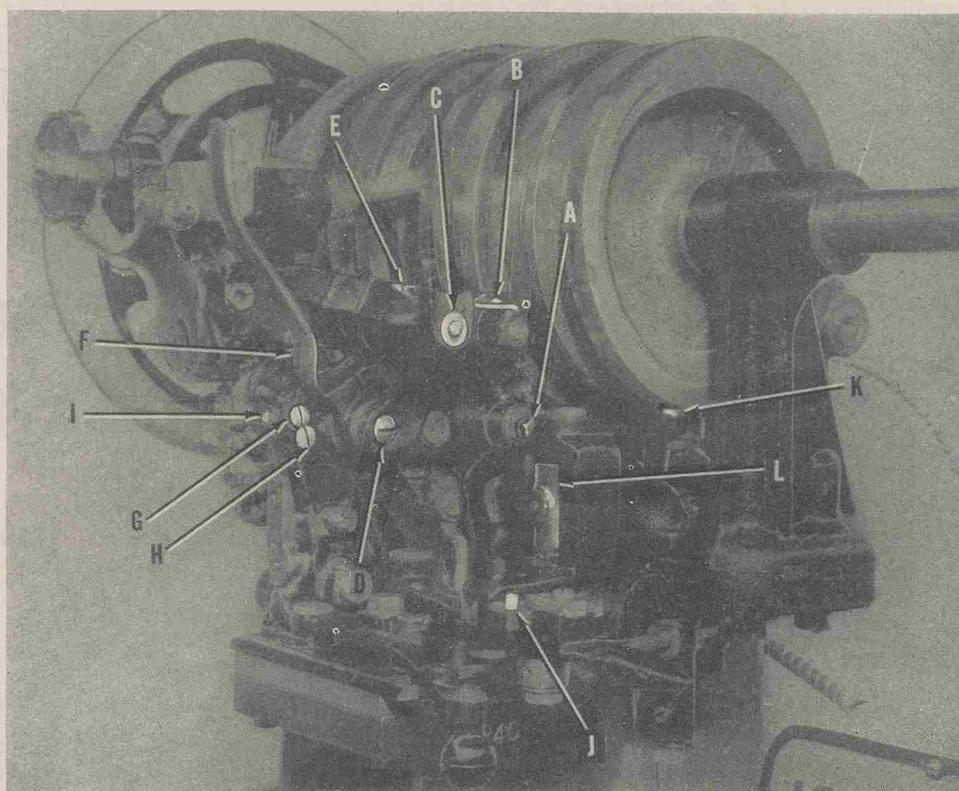
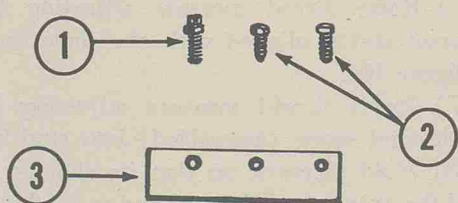


Figure 101.

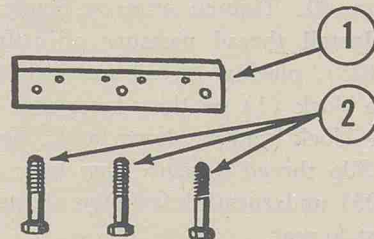
(113) Place feed slide retaining plate (3, fig. 102) as shown in H, figure 73, aligning corresponding screw holes. Insert and tighten three feed slide retaining plate retaining screws (1), (2), placing square-headed screw in screw hole at left.

(114) Place feed slide retaining gib (1, fig. 103) as shown at I, figure 73, aligning corresponding screw holes. Insert feed slide retaining gib retaining screws (2) from underneath. Do not tighten these screws at this time.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K26-308A	Feed slide retaining plate retaining screw (square head).
2	K26-308	Feed slide retaining plate retaining screws (round head).
3	K26-8	Feed slide retaining plate.

Figure 102. Feed slide retaining plate assembly.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K26-6B	Feed slide retaining gib.
2	K26-306B	Feed slide retaining gib retaining screws.

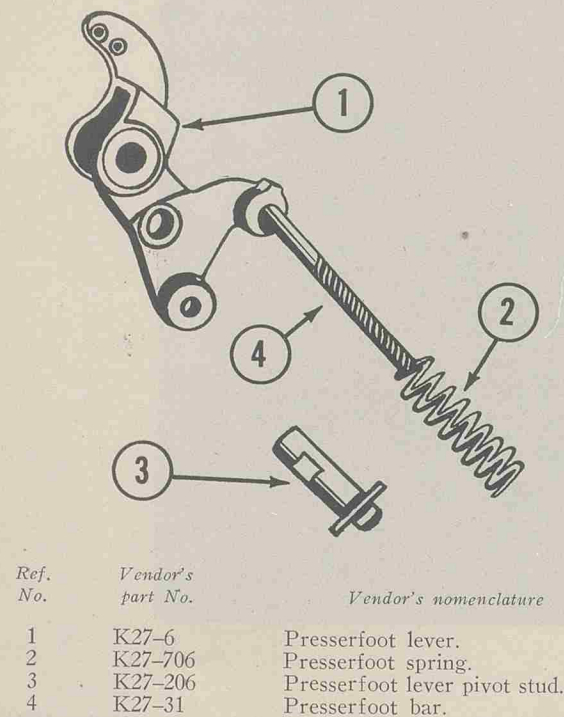
Figure 103. Feed slide retaining gib.

(115) Install presserfoot lever (1, fig. 104), placing presserfoot spring (2) on presserfoot bar (4) with large end going on first.

(116) Insert bar at D, figure 73.

(117) Press presserfoot bar firmly and turn bar back and forth until end of bar slips down into the presserfoot bar nut.

(118) Swing presserfoot lever (1, fig. 104) to the left until pivot of presserfoot rests astride the stud hole as shown at J, fig. 73.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-6	Presserfoot lever.
2	K27-706	Presserfoot spring.
3	K27-206	Presserfoot lever pivot stud.
4	K27-31	Presserfoot bar.

Figure 104. Presserfoot lever assembly.

(119) Insert presserfoot lever pivot stud (3, fig. 104) as shown at J, figure 89.

(120) Align setscrew seat with setscrew as shown at K, figure 89. Tighten setscrew firmly.

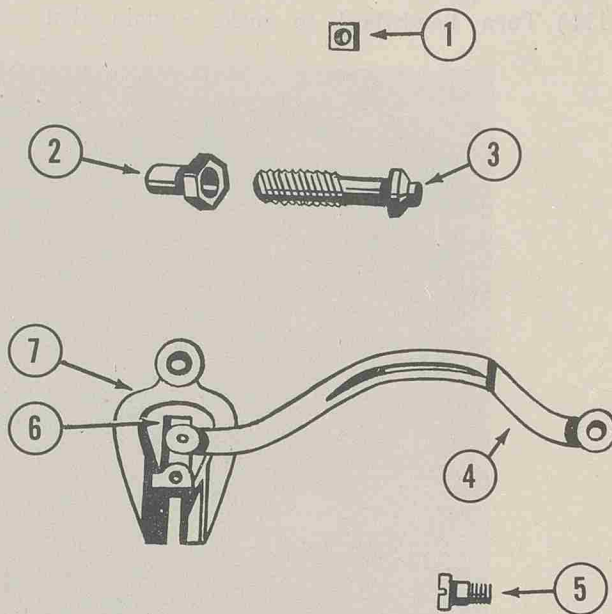
(121) Install thread measure adjusting bracket (7, fig. 105), placing thread measure slide block lever slide block (1) on thread measure slide block lever slide block stud as shown at L, figure 89.

(122) Slip thread measure cam lever connection (4, fig. 105) underneath left flange of cam No. four from front to rear.

(123) Tilt top of thread measure adjusting bracket to the right, and place fork astride thread measure adjusting bracket eccentric stud as shown at M, figure 89, and to the left of the flange.

(124) Hold top of thread measure adjusting bracket with thumb and forefinger of right hand;

with forefinger of the left hand, align slide block (1, fig. 105) with slide block race. Press top of bracket slightly to the left and downward.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K27-116	Thread measure slide block lever slide block.
2	K27-216	Thread measure adjusting bracket eccentric.
3	K27-316	Thread measure adjusting bracket eccentric stud screw.
4	K27-14	Thread measure cam lever connection.
5	K27-214	Thread measure lever connecting stud.
6	K27-15	Thread measure adjusting slide.
7	K27-16	Thread measure adjusting bracket.

Figure 105. Thread measure assembly.

(125) Place thread measure adjusting bracket eccentric (2, fig. 105) on stud screw (3).

(126) Raise thread measure adjusting bracket until pivot end is aligned with stud hole as shown at A, figure 101.

(127) Insert thread measure adjusting bracket eccentric stud screw (assembled) into stud hole.

(128) Hold eccentric so that its shortest end is toward the front, then tighten stud at A, figure 101.

(129) Align stud hole end of thread measure cam lever connection (4, fig. 105) from rear with stud hole of thread measure cam lever (1, fig. 95) as shown at A, figure 106.

(130) Insert thread measure lever connecting stud (5, fig. 105) as shown at A, figure 106. Tighten stud firmly.

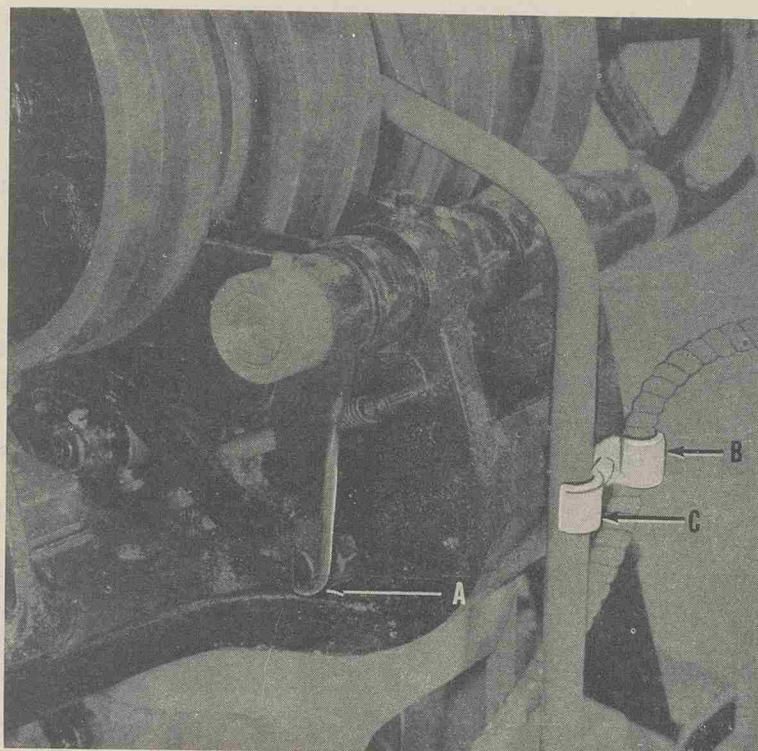


Figure 106.

(131) Place pivot end of thread lifter lever (1, fig. 107) astride thread lifter lever pivot bracket as shown at K, figure 73. Insert thread lifter lever slide block (2, fig. 107) into slide block race at the end of thread lifter cam lever (see fig. 90) as shown at B, figure 101.

(132) Align pivot end of thread lifter lever (1, fig. 107) with stud hole as shown at K, figure 73.

(133) Insert thread lifter lever pivot stud (3, fig. 107) with thread lifter lever stud support bracket (4) into stud hole as shown at C, figure 101.

(134) Place lower end of stud support bracket (4, fig. 107) over presserfoot lever pivot stud as shown at D, figure 101.

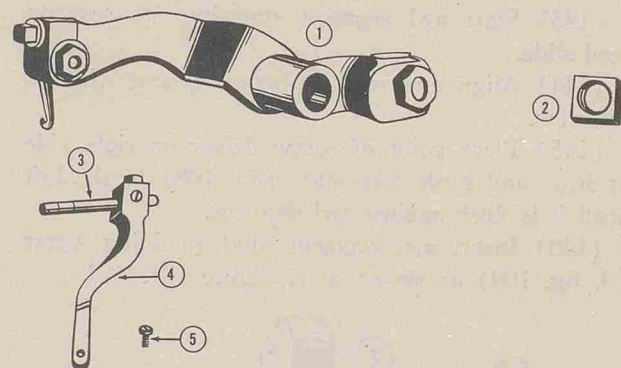
(135) Insert thread lifter lever stud support bracket clamp screw (5, fig. 107) as shown at D, figure 101. Tighten screw firmly.

(136) Tighten firmly thread lifter pivot stud binding screw as shown at E, figure 101.

(137) Install feed slide (see fig. 108), filling oil reservoir as at L, figure 73.

(138) Drop ends of oil wicks into reservoir, move feed slide to right, and insert end into slot as shown at M, figure 73.

(139) Move feed slide to left until contact is made with presserfoot lever. Step on presserfoot



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K29-8	Thread lifter lever.
2	K29-107A	Thread lifter lever slide block.
3	K29-208	Thread lifter lever pivot stud.
4	K29-9	Thread lifter lever stud support bracket.
5	K29-309	Thread lifter lever stud support bracket clamp screw.

Figure 107. Thread lifter assembly.

foot pedal and slide head of feed slide to position directly under presserfoot hand lever as shown at F, figure 101.

(140) Insert awl segment stud (1, fig. 109) into awl segment (2) from left to right with awl

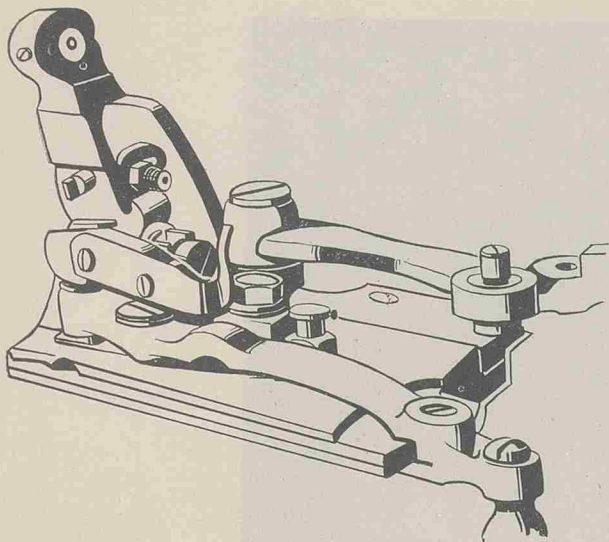


Figure 108. Feed slide—assembled (K26-6).

clamp facing front.

(141) Turn handwheel until awl cam lever (5, fig. 64) is at lowest position.

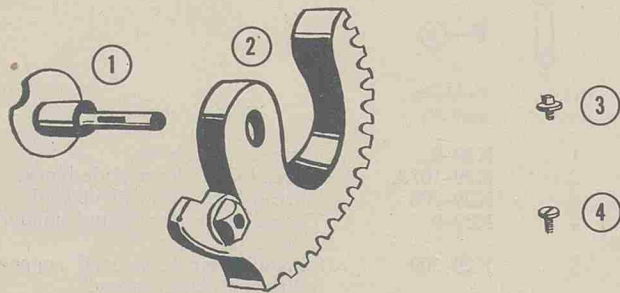
(142) Place assembled awl segment so that first tooth at top of awl segment will fit into the slot between second and third tooth of the awl cam lever.

(143) Start awl segment stud into its seat on feed slide.

(144) Align awl segment setscrew seat with its setscrew.

(145) Place point of screw driver on right side of head and push feed slide (fig. 108) to the left until it is flush against awl segment.

(146) Insert awl segment stud retaining screw (3, fig. 109) as shown at G, figure 101.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K26-210A	Awl segment stud.
2	K26-10	Awl segment.
3	K26-310B	Awl segment stud retaining screw.
4	K26-310C	Awl segment stud retaining binding screw.

Figure 109. Awl segment assembly.

(147) Tighten retaining screw (3, fig. 109) sufficiently to take out side play from segment.

(148) Push feed slide to the right about $\frac{1}{4}$ inch so that needle and awl segments will not touch each other.

(149) Turn handwheel to check for no binding in awl segment.

(150) If awl segment binds, loosen the retaining screw lightly as shown at G, figure 101, and tap screw lightly. Check again. If awl segment still binds, loosen screw slightly and tap again, being careful not to loosen enough so that side play sets in.

(151) Insert awl segment stud retaining screw binding screw (4, fig. 109) as shown at H, figure 101, and tighten it securely.

(152) Tighten setscrew as shown at I, figure 101.

(153) Install feed cam lever (2, fig. 111), placing feed-adjusting lever slide block (see fig. 110) on pivot stud (1, fig. 111) as shown at J, figure 101.

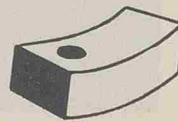


Figure 110. Feed adjusting lever slide block (K26-3A).

(154) Insert feed cam lever (2, fig. 111) with roll entering cam No. four roll race as shown at K, figure 101.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K26-201A	Feed cam lever pivot stud.
2	K26-1	Feed cam lever.

Figure 111. Feed cam lever assembly.

(155) Align feed adjusting lever slide block (fig. 110) with feed cam lever slide block race and press down over slide block.

(156) Slide feed cam lever into position on feed

cam lever bracket (1, fig. 97) as shown at L, figure 101, so that pivot hole in lever is aligned with stud hole of bracket.

(157) Turn handwheel until cam No. four is in position, so that offset in cam race will permit feed cam lever pivot stud (1, fig. 111) to enter cam race and drop into position.

(158) Tighten setscrew as shown at A, figure 112.

(159) Connect rocker arm swivel connection, placing pivot end of swivel connection in position underneath feed and guiding handle as shown at B, figure 112.

(160) Place swivel retaining nut washer (1, fig. 113) on rocker arm connecting stud. (See 2, fig. 113.)

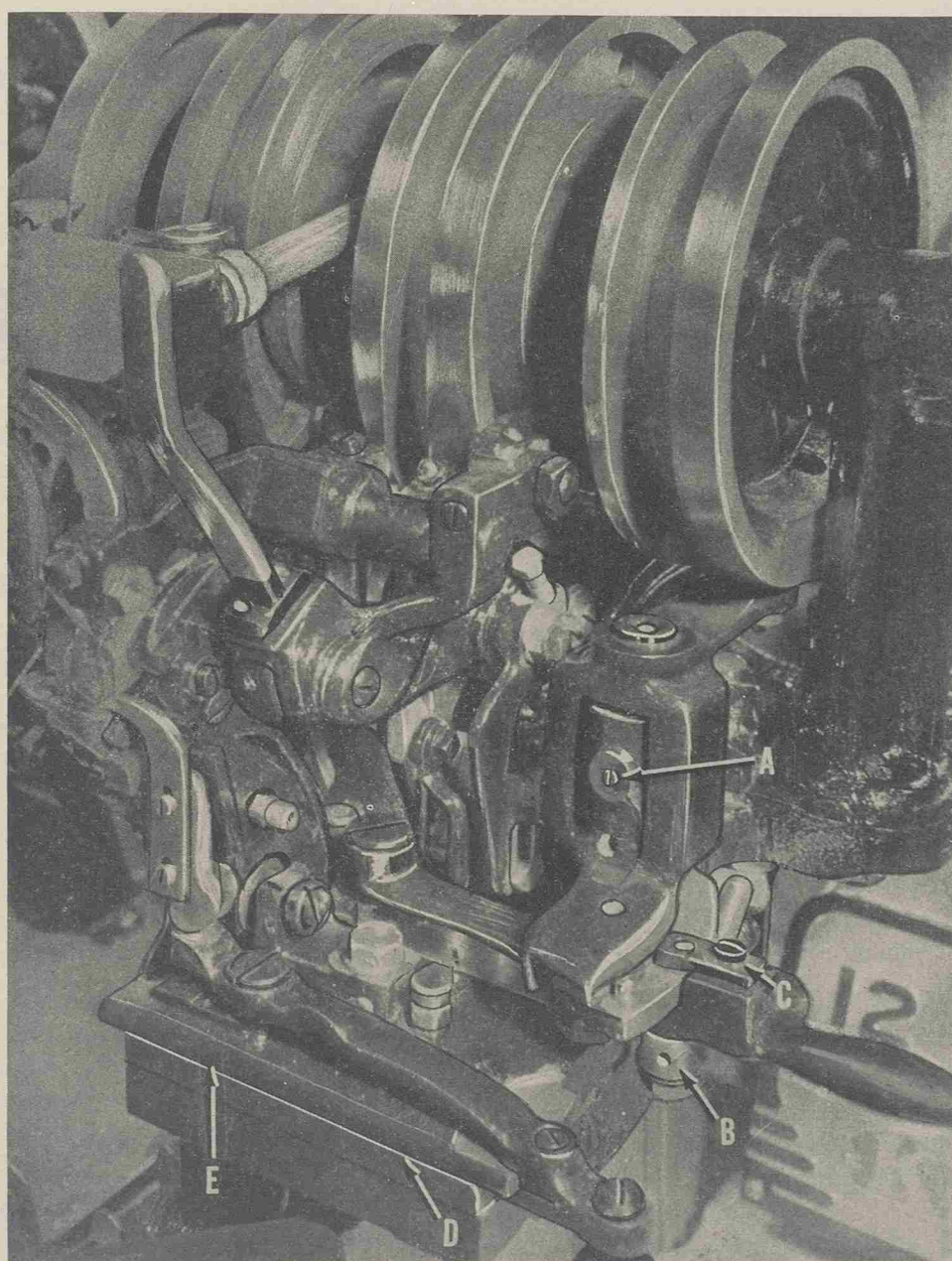


Figure 112.

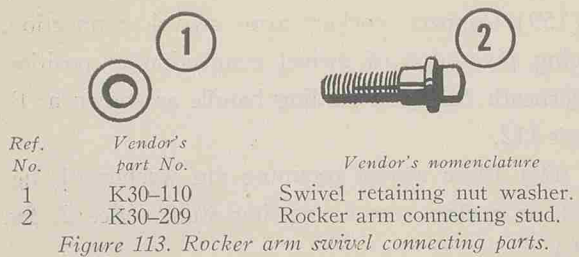


Figure 113. Rocker arm swivel connecting parts.

(161) Insert stud from underneath, attaching pivot end of rocker arm swivel connection to feed and guide handle.

(162) Place feed and guide handle retaining plate (2, fig. 114), as shown at C, figure 112.

(163) Insert feed and guide handle retaining plate screw (1, fig. 114) and tighten firmly.

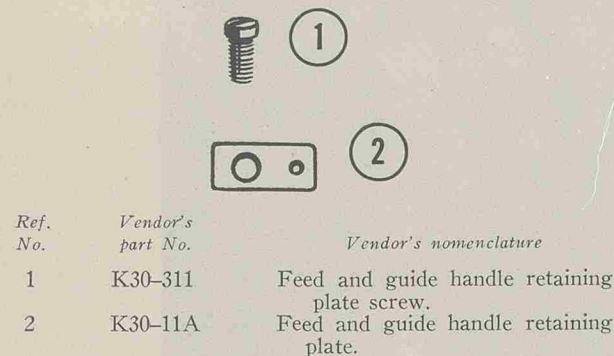


Figure 114. Feed and guide handle retaining plate assembly.

(164) Adjust feed slide, placing end of screw driver on feed slide retaining gib (1, fig. 103) as shown at D, figure 112, directly over feed slide retaining gib retaining stud.

(165) Press in gib (1, fig. 103) very firmly and hold in while tightening gib retaining screw (2).

(166) Place end of screw driver on feed slide retaining gib at E, figure 112, directly over feed slide retaining gib retaining screw.

(167) Press gib in very firmly and hold in while tightening gib retaining screw.

(168) Tighten center gib retaining screw.

(169) Recheck the three gib retaining studs to see that they are all tightened firmly.

(170) Place shuttle case (1, fig. 115) on head, aligning four screw holes in the head as shown at A, figure 117, and keeping flat side of shuttle case on top.

(171) Insert shuttle case to head retaining screws (2, fig. 115) and tighten firmly.

(172) Install shuttle driver (5, fig. 116) and

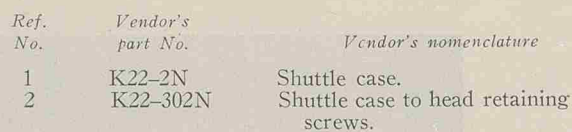
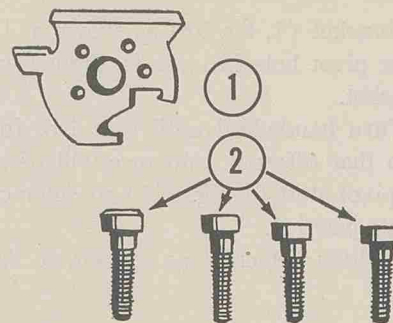


Figure 115. Shuttle case assembly.

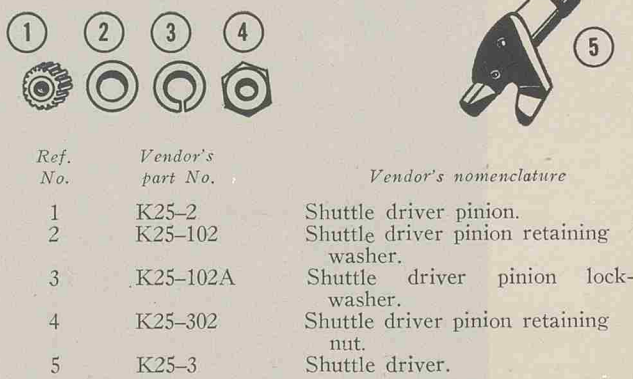


Figure 116. Shuttle driving assembly.

shuttle driver pinion (1), turning handwheel so that shuttle cam lever (fig. 66) is at its lowest position.

(173) Insert shuttle driver as shown at B, figure 117.

(174) Turn shuttle driver into position where right prong of fork is directly over the lowest cut-away point of shuttle case.

(175) Pull shuttle driver back with right hand until threaded end of shuttle driver is flush with shuttle case head, making sure to maintain position of key on shuttle driver as originally set.

(176) Place shuttle driver pinion (1, fig. 116) with left hand so that the large flat surface of pinion is facing head.

(177) Insert shuttle driver pinion into the gears of shuttle cam lever, making sure key race in pinion

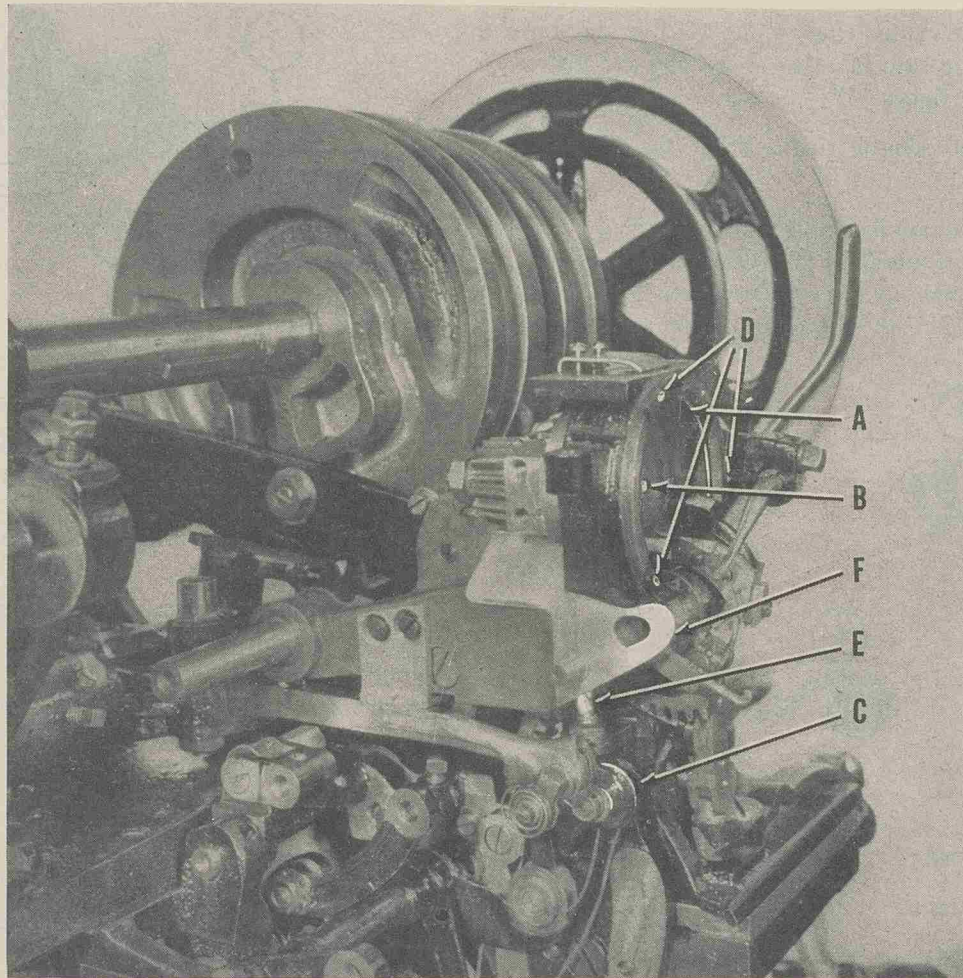


Figure 117.

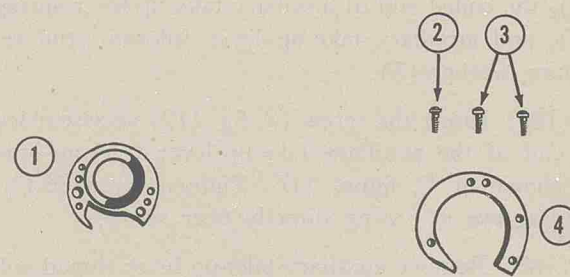
is in alignment with key on shuttle driver. Move shuttle driver pinion to position flush against head, holding it firmly. Insert shuttle driver into shuttle driver pinion.

(178) See that the shuttle driver is in a position where the right prong of fork is directly over the lowest cutaway point of the shuttle case, when shuttle cam lever is at its lowest position.

(179) Turn the machine over slowly by use of the handwheel and see that the needle segment (2, fig. 99) enters between the prongs of the shuttle driver.

(180) Place on the threaded end of shuttle driver in the order listed, the shuttle driver pinion retaining washer (2, fig. 116), shuttle driver pinion lock-washer (3), and shuttle driver pinion retaining nut (4), and tighten firmly.

(181) Install shuttle (1, fig. 118), placing shuttle in the shuttle case (1, fig. 115) as shown at A, figure 117, so that both prongs of the shuttle driver (5, fig. 116) are in the cutaway portion of the shuttle.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K25-4	Shuttle.
2	K22-302C	Shuttle ring screw (round head).
3	K22-302A	Shuttle ring screws (flat head).
4	K22-2A	Shuttle ring (bronze).

Figure 118. Shuttle assembly.

(182) Place shuttle ring (4, fig. 118) on the shuttle case, making sure that the screw holes are aligned as shown at D, figure 117.

(183) Insert shuttle ring screws (fig. 118) and tighten firmly.

(184) Install auxiliary take-up (assembled), placing pivot end of auxiliary take-up lever (1, fig. 119) on auxiliary take-up lever fulcrum stud, as shown at C, figure 117, with thread roll facing to the front.

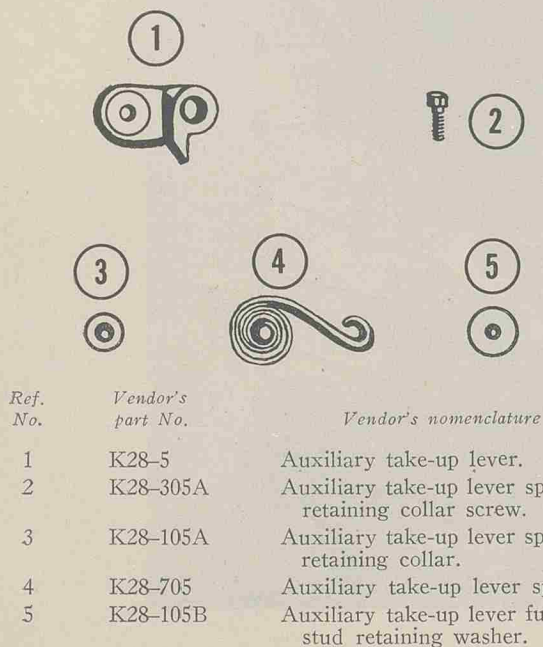


Figure 119. Auxiliary take-up lever spring assembly.

(185) Assemble on auxiliary take-up lever spring retaining collar screw (2, fig. 119), in the order listed, auxiliary take-up lever spring retaining collar (3), the coiled end of auxiliary take-up lever spring (4), and auxiliary take-up lever fulcrum stud retaining washer (5).

(186) Insert the screw (2, fig. 119) as assembled in end of the auxiliary take-up lever fulcrum stud as shown at C, figure 117. Tighten screw firmly, holding eye of spring directly over screw.

(187) Remove auxiliary take-up lever thread roll stud nut as shown at C, figure 117.

(188) Hook the eye end of auxiliary take-up lever spring (4, fig. 119) over end of auxiliary take-up lever thread roll stud, and replace the nut, with the shoulder entering into the eye of the spring. Tighten the nut firmly.

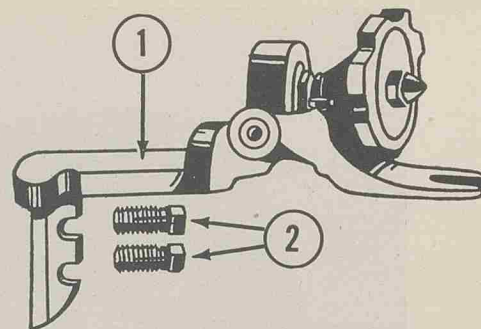


Figure 120. Guide arm bracket—assembly.

(189) Install bobbin case guide arm bracket (1, fig. 120), placing bobbin case guide arm bracket assembly as shown at A, figure 121 and inserting the end of short oil pipe into the shuttle driver oil hole on top of head, behind the shuttle case (1, fig. 115), and the long oil pipe directly over the awl segment (2, fig. 109).

(190) Place shuttle heat unit guard (1, fig. 122) on the flat top of shuttle case (1, fig. 115) as shown at B, figure 121, with conduit in between cams Nos. two and three. (See 1 and 2, fig. 64.)

(191) Connect shuttle conduit connection, located between the back of column and motor.

(192) Place shuttle heat unit clamp (6, fig. 122) on shuttle electric unit (5), aligning screw holes in clamp with screw holes in the flat top of shuttle case.

(193) Insert shuttle heat unit clamp retaining screws (7, fig. 122) and tighten firmly.

(194) Insert guide arm bracket brace screw (2, fig. 122) into screw hole of shuttle heat unit guard (1) as shown at C, figure 121. Tighten firmly.

(195) Insert guide arm bracket retaining screws as shown at D, figure 121. Tighten firmly.

(196) Place shuttle heat unit guard cover (3, fig. 122) on shuttle heat unit guard (1) as shown at E, figure 121, with end of oil pipe inserted into oil hole in the flat top side of shuttle case.

(197) Insert guard cover retaining screws (4, fig. 122) and tighten firmly.

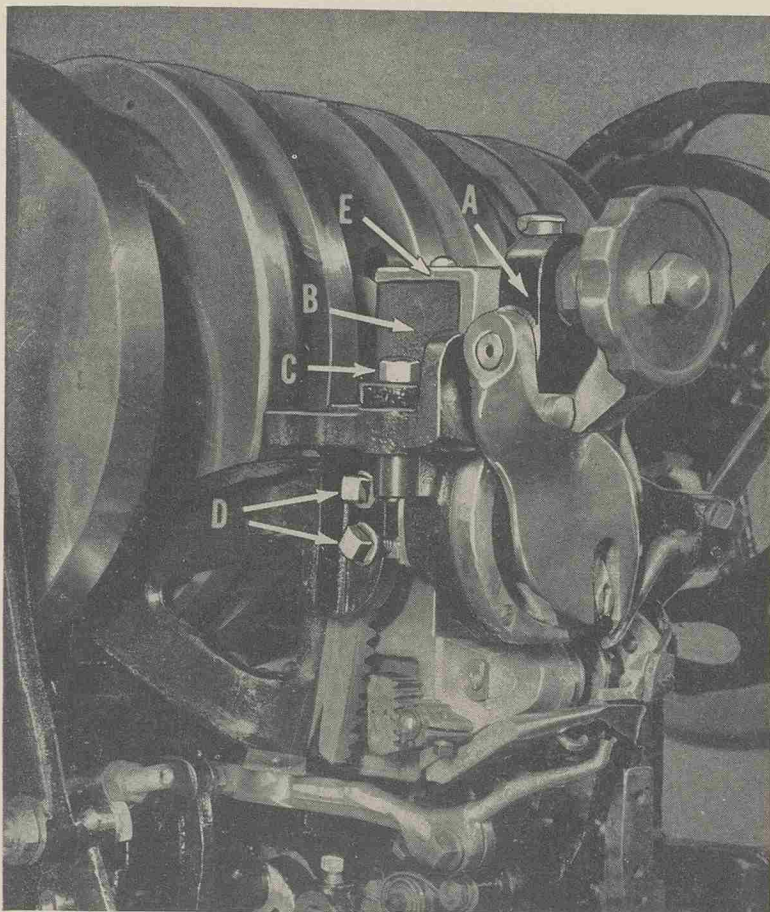
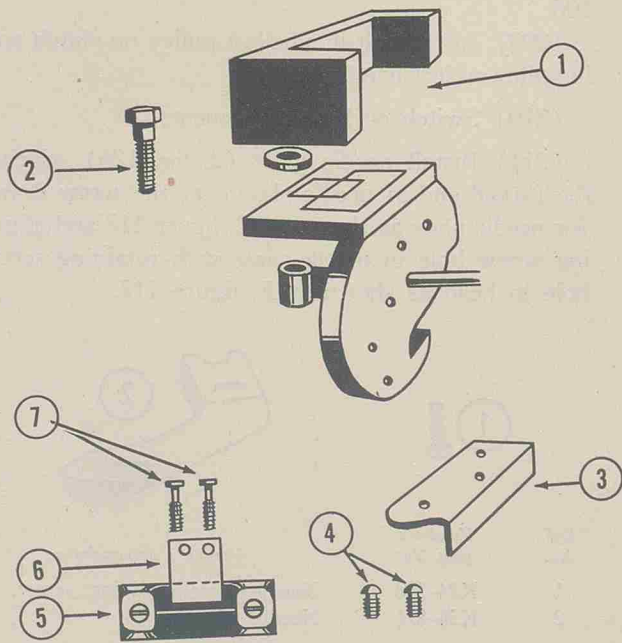


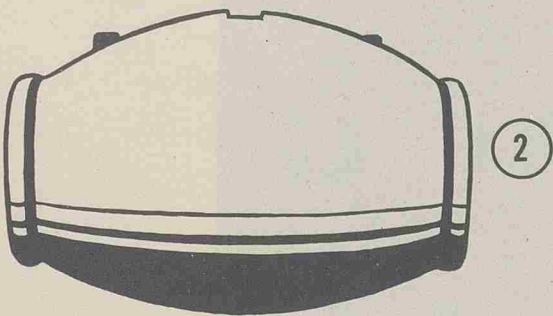
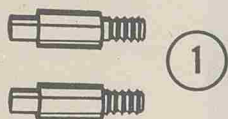
Figure 121.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K22-2K	Shuttle heat unit guard.
2	K22-304N	Guide arm bracket brace screw.
3	K22-2G	Shuttle heat unit guard cover.
4	K22-302GN	Shuttle heat unit guard cover retaining screws.
5	K22-902C	Shuttle electric unit.
6	K22-602N	Shuttle heat unit clamp.
7	K22-302FA	Shuttle heat unit clamp retain- ing screws.

Figure 122. Shuttle heat unit assembly.

(198) Place cam cover (2, fig. 123) over cams, with the brackets on cover aligned with the ends of the cam lever shaft. (See fig. 65.)

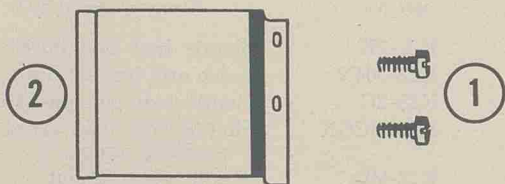


Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K23-209	Cam cover pivot studs.
2	K23-9	Cam cover.

Figure 123. Cam cover assembly.

(199) Insert cam cover pivot studs (1, fig. 123) and tighten firmly.

(200) Place heat guard cover plate (2, fig. 124) on the right side of the wax pot heating unit, aligning the screw holes in the plate with the screw holes in the column.

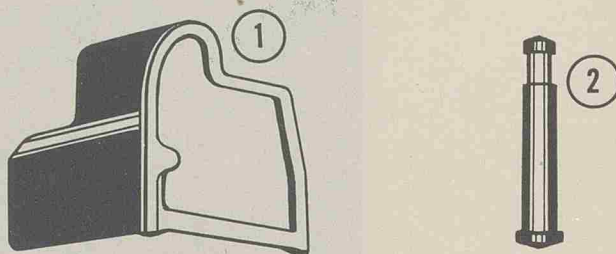


Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K31-325H	Heat guard cover plate retaining screws.
2	K31-625	Heat guard cover plate.

Figure 124. Heat guard cover plate assembly.

(201) Insert heat guard cover plate retaining screws. (See 1, fig. 124.) Tighten firmly.

(202) Place heat guard (1, fig. 125) on right-hand cover of shelf bracket.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K31-25D	Heat guard.
2	K31-525D	Heat guard pivot pin.

Figure 125. Heat guard assembly.

(203) Insert heat guard pivot pin (2, fig. 125) from underneath through pivot hole in shelf bracket and into stud hole of heat guard bracket.

(204) Tighten heat guard pivot pin setscrew.

(205) Connect assembled work light fixture by inserting pivot end of clamp into the hole of the bracket on top of cam cover.

(206) Tighten light bracket thumbscrew.

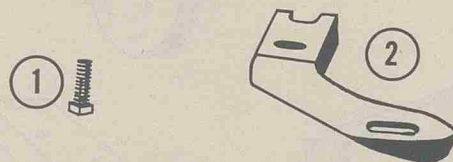
(207) Place clamp at rear of head base over shuttle heating unit and over work light fixture conduits as shown at B, figure 106.

(208) Tighten clamp screw as shown at C, figure 106.

(209) Install belt in smallest pulley on clutch and in pulley on left-hand wheel.

(210) Switch on heating elements.

(211) Install needle plate (2, fig. 126), placing the forked end of needle plate over the screw dowel for needle plate as shown at E, figure 117 and aligning screw hole in needle plate with retaining screw hole in head as shown at F, figure 117.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	K24-308	Needle plate retaining screw.
2	K24-8H	Needle plate.

Figure 126. Needle plate assembly.

(212) Insert needle plate retaining screw (1, fig. 126) and tighten firmly.
b. Install needle as instructed in paragraph 29.

c. Install looper as instructed in paragraph 61.
d. Install thread lifter as instructed in paragraph 31.

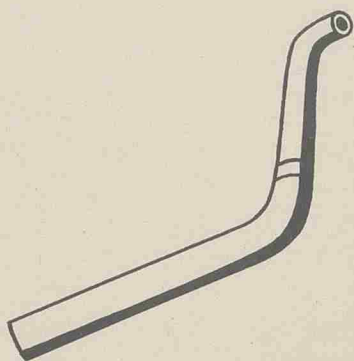


Figure 127. Looper (K29-5).

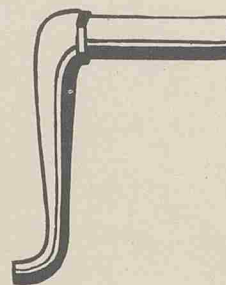


Figure 128. Thread lifter (K29-10).

BOOK 2

FINISHING MACHINE

American Model L

Landis, 100 Line, Model 102

PART ONE INTRODUCTION

Section I. GENERAL

74. Scope

The instructions in book 2 apply to the Finishing Machine, American Model L and Landis, 100 Line, Model 102. The finishing machine contains the buffing, sanding, and trimming wheels which dress the shoe in the final stage of the shoe repair operation.

a. Part two contains information on the operation of the finishing machine with a description of its controls and instruments.

b. Part three contains information for the guidance of personnel of using organizations responsible for the first and second echelon maintenance of the finishing machine. It contains information needed for the performance of the scheduled lubrication and preventive maintenance services. Paragraphs 110 through 125 are devoted to second echelon maintenance and adjustment of the various assemblies and major units comprising the Landis, 100 Line, Model 102 and the American Model L Finishing Machines. These sections contain short descriptions of components of the systems in the machine and explanations of their functioning and interrelationship. Only the maintenance which the unit mechanic of the using organization is authorized to perform is included in these sections. The components of the finishing machine are relatively simple in construction and operation, and the unit mechanic of the using organization may repair any assembly of the finishing machine except the motor.

75. Records

a. WD AGO FORM 460 (PREVENTIVE MAINTENANCE ROSTER). The parts of this form which apply to stitching machines may be maintained to record the lubrication of this equipment as described in paragraphs 102 and 103.

b. WD AGO FORM 468 (UNSATISFACTORY EQUIPMENT REPORT). This form will be used to

report defects in the manufacturing, design, or operation of machines, assemblies, or parts. The same form will be used to report complaints on the lubricants and preserving materials used in the machines. When so used, the form will contain identifying details of the products and the machinery on which they are used.

76. Orientation

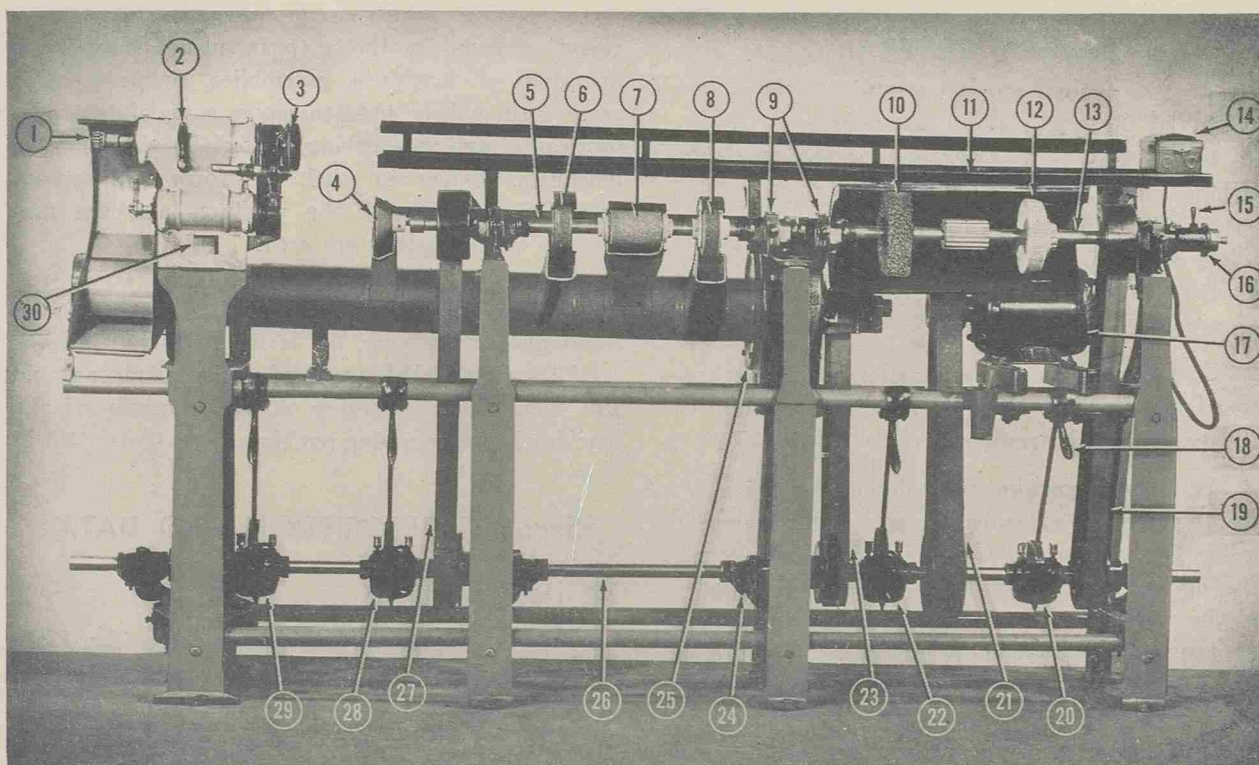
Throughout this book, the terms FRONT, REAR, LEFT, and RIGHT are used as the operator would use them when standing at the controls of the machine in the operating position.

Section II. DESCRIPTION AND DATA

77. Description

a. GENERAL. In the finishing machine (fig. 129), the power shaft runs through the length of the base of the machine. The upper shaft carries the operating wheels. The edge trimmer, stitch picker, and cutter grinder are mounted as a unit in the end of the machine frame but are driven by the power shaft. In the Landis portable shoe repair unit Model 12 K-100 Special (fig. 131), the finishing machine is mounted on a common frame with the stitcher unit. These machines are powered by a 1½-horsepower electric motor.

b. IDENTIFICATION INFORMATION. The operator should be able to identify the manufacturer, model, and serial number of his machine. This information is especially important in the requisitioning of replacement parts. On the American Model L (fig. 130) and the Landis, 100 Line, Model 102 (fig. 129) the name of the manufacturer appears on all of the four front frame legs. On both machines an identification plate appears at the top of the front leg beneath the edge trimmer. The finisher in the Landis portable shoe repair unit Model 12 K-100 Special (fig. 131) will be designated by that model and number.



Ref. No.	Nomenclature	Ref. No.	Nomenclature
1	Edge trimmer.	16	Edge setter.
2	Brake lever.	17	Motor.
3	Cutter grinder.	18	Clutch control handle.
4	Heel breaster.	19	Burnisher shaft drive belt.
5	Sander shaft.	20	Burnisher shaft clutch.
6	Heel sander.	21	Power shaft drive belt.
7	Bottom sander.	22	Blower clutch.
8	Heel sander.	23	Blower drive belt.
9	Sander and burnisher shaft bearings.	24	Power shaft bearing.
10	Finishing brush.	25	Blower.
11	Shelf.	26	Power shaft.
12	Burnishing wheel.	27	Sander shaft drive belt.
13	Burnisher shaft.	28	Sander shaft clutch.
14	Power switch.	29	Edge trimmer clutch.
15	Edge setter heat control handle.	30	Edge trimmer drive belt.

Figure 129. Landis, 100 Line, model 102 finishing machine.

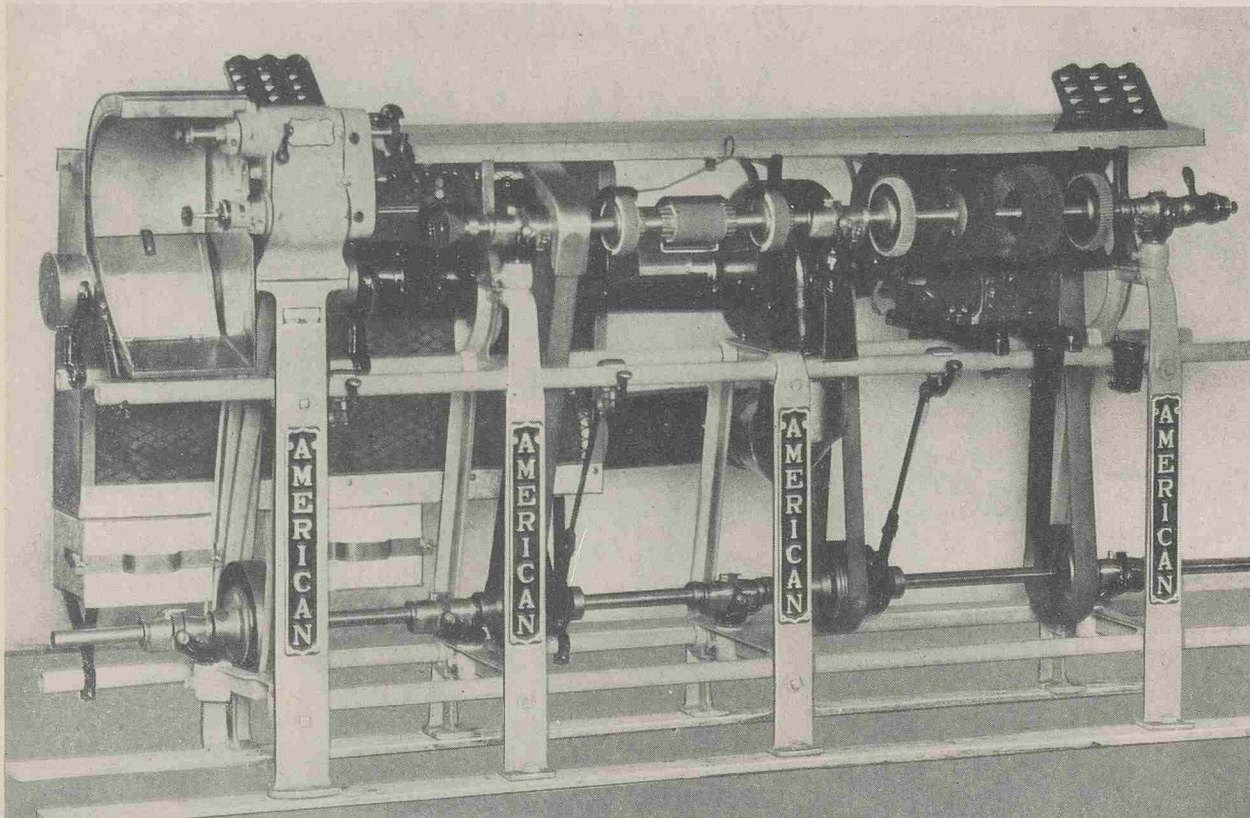


Figure 130. American model L finishing machine.

c. DIFFERENCES IN MODELS. For operational purposes, the American Model L finisher and the Landis, 100 Line, Model 102 finisher may be considered alike. For maintenance purposes, the two models differ only in clutch design. (See par. 110.) Minor differences in the structural detail of these models are apparent in figures 129 and 130.

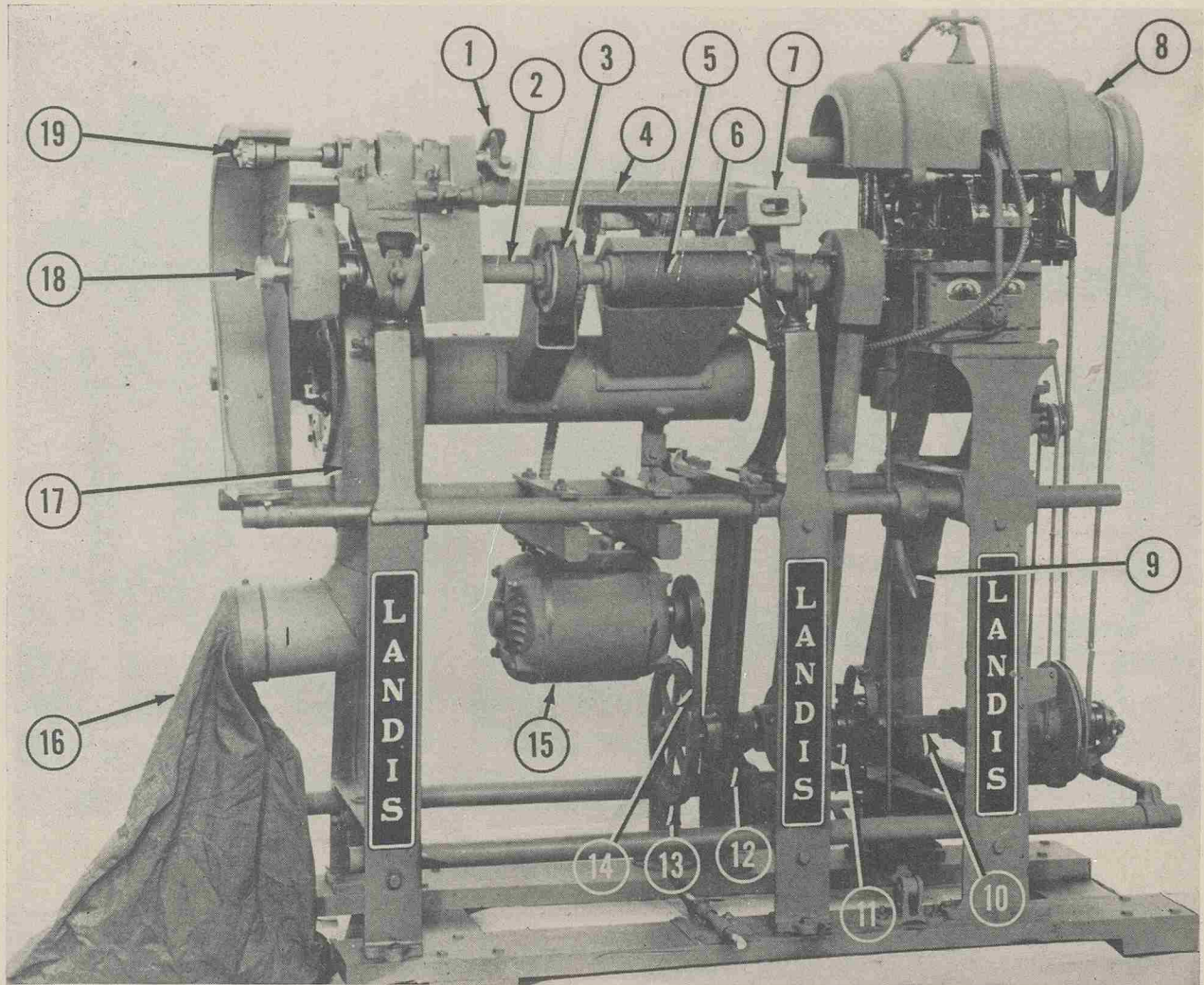
78. Tabulated Data

a. FINISHER SPECIFICATIONS, LANDIS, MODEL, PACKAGED.

Dimensions (in.)			Weight (lb.)		
Length	Width	Height	Gross	Net	Dust collector
105	25	60	1,340	775	42

b. MOTOR SPECIFICATIONS.

Horsepower.....	1.5
Phase.....	Single
Cycles.....	60
Volts.....	110-220
Revolutions per minute.....	1,750



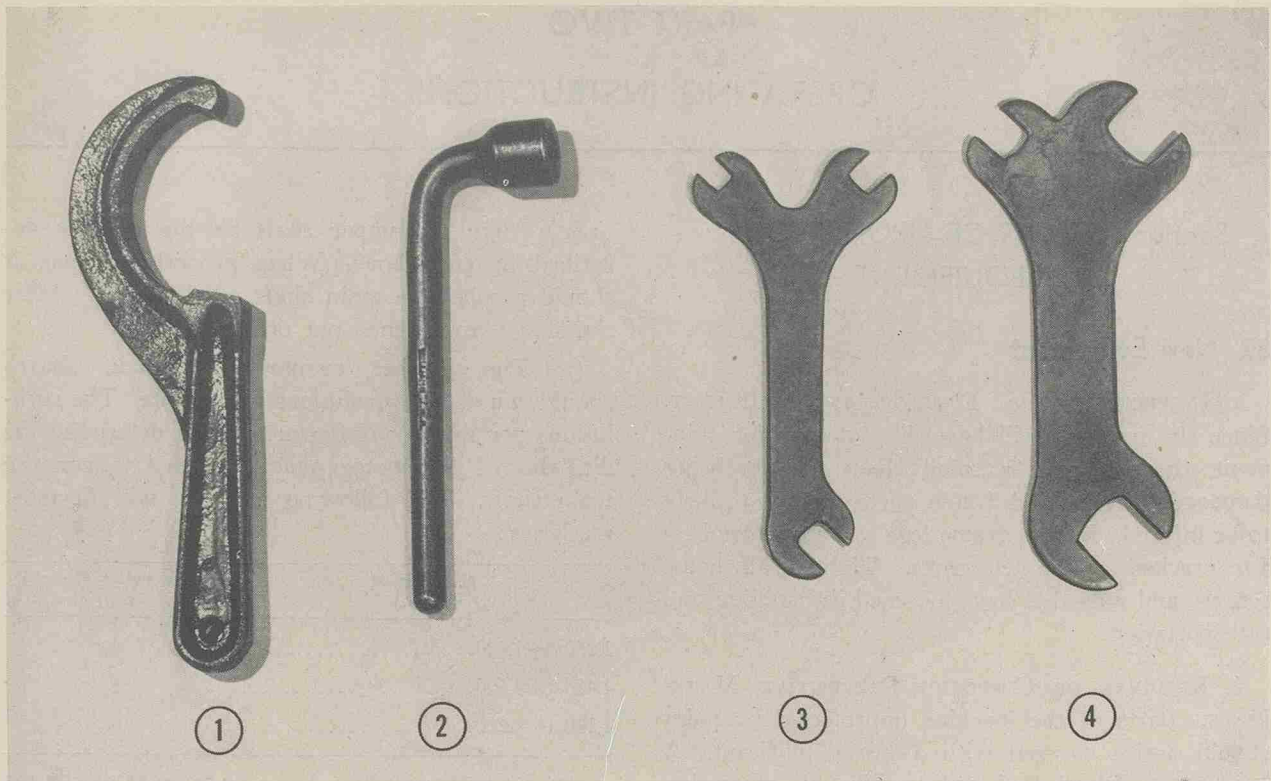
Ref.
No. Nomenclature

- | | |
|----|----------------------------------|
| 1 | Cutter grinder. |
| 2 | Finishing shaft. |
| 3 | Heel sander. |
| 4 | Shelf. |
| 5 | Bottom sander. |
| 6 | Bottom sander hood. |
| 7 | Power switch. |
| 8 | Landis 12 K sole-stitching unit. |
| 9 | Clutch control handle. |
| 10 | Power shaft. |

Ref.
No. Nomenclature

- | | |
|----|----------------------|
| 11 | Clutch. |
| 12 | Power shaft bearing. |
| 13 | Drive pulley. |
| 14 | Power drive belt. |
| 15 | Motor. |
| 16 | Dust collector. |
| 17 | Blower. |
| 18 | Edge setter. |
| 19 | Edge trimmer. |

Figure 131. Landis portable shoe repair unit, Model 12 K-100 Special.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	26-5H	Spanner wrench.
2	60-4-905C	Socket wrench.
3	60-8-601	Triple head wrench.
4	60-8-602	Triple head wrench.

Figure 132. Tools.

Section III. TOOLS AND ACCESSORIES

79. Tools

The American and Landis models of finishing machines are supplied with the tools shown in figure 132.

80. Supplies

a. The following standard supplies are issued with the finishing machine:

Description	Quantity
Finisher oil	1 quart
F. S. sandpaper.....	18 covers
Heel breaster sandpaper.....	3 sheets
9 by 11 sandpaper.....	3 sheets
No. 6 burnisher covers.....	4
Grinding wheel, 60-2-12.....	1

b. For additional supplies issued to the using organization, see paragraph 101.

81. Accessories

In addition to the standard tools and supplies the following accessories are supplied with each model:

Description	Quantity
No. 1 stag belt hook.....	3
$\frac{3}{8}$ -inch black iron washers.....	8
2½ by 74-inch leather belt.....	1
$\frac{3}{8}$ by 2-inch machine belts (60-6-303A).....	4

PART TWO

OPERATING INSTRUCTIONS

Section IV. SERVICE UPON RECEIPT OF EQUIPMENT

82. New Equipment

a. INSPECTION FOR DAMAGE IN SHIPMENT. Since the machine will be well protected for shipment, there is only a small chance of its being damaged. Frame and frame parts are most likely to be injured. Inspect frame legs and cross members for cracked or broken parts. Tighten all bolts, screws, and nuts that have loosened in handling and transportation.

b. REMOVAL OF CORROSION-PREVENTIVE MATERIALS. Parts of the machine unprotected by paint should arrive covered with a heavy lubricant. A mixture of Diesel fuel and machine oil containing not more than 15 percent machine oil serves well as a cleaning solution. Remove corrosion-preventive material with cleaning solution and a brush or coarse cloth.

c. INSTALLATION. (1) *Model 102 and Model L (figs. 129 and 130).* (a) Examine flooring upon which the finisher is to be placed. If it is weak or unstable, brace or reinforce it. Each leg of the finisher must rest on a solid base and must be firmly secured. If floor is uneven, level the machine with wooden shingles or metal shims and fasten legs to floor with lag screws furnished for that purpose.

(b) When legs are secured, align the shafting. Shafts must be aligned correctly to prevent bearings from heating and sticking. Moreover, a poorly aligned shaft requires an excessive amount of power and will be a constant maintenance problem. Align main shaft (power shaft) first. Proper horizontal alignment can be determined by stretching a string from one leg of the frame to the other. Measured distance between the shaft and the string should be equal at all points. The shaft can best be aligned vertically by placing a spirit level on the top of the shaft. When the shaft is properly aligned, it will turn freely by hand when the belts are off.

(c) Align the upper shaft in the manner described in (b) above. When properly aligned, it should parallel the main shaft at all points. After the shafts are aligned put on the belts.

(d) The finisher countershaft (main shaft) should run at 850 revolutions per minute. The revolutions per minute of the motor will determine the diameter of the motor pulley required to run the main shaft. The following schedule will fit most machines:

Motor speed (r.p.m.)	Motor pulley diameter (in.)
1,750 to 1,800.....	4
1,450 to 1,500.....	5
1,100 to 1,200.....	6

(2) *Landis portable shoe repair unit Model 12 K-100 Special (fig. 131).* The unit is installed by unloading it from the repair trailer and setting it on some level base. (See book 5.) Align power shaft of unit and upper shaft of finisher.

d. RUN-IN TEST. (1) Lubricate machine as prescribed in paragraphs 102 and 103.

(2) Connect electric motor with a power circuit (220-volt line is preferable). Move switch to ON.

(3) Engage clutches one at a time by raising the clutch lever handles. Check the alignment and clearing of the belts. The main shaft and upper shaft should turn freely without apparent end play or vibration. When edge trimmer clutch is engaged, the edge trimmer should start smoothly and run quietly.

(4) Run the machine until shafts and bearings appear to have worked in smoothly. Stop the machine. Remove belts. Shafts should turn freely by hand. Bearings should be cool. Check to see that bearings, clutches, and all nuts and screws are secure. If machine is found to be in satisfactory operating condition, replace belts.

83. Used Equipment

Services performed upon the receipt of used equipment are the same as those described for new equip-

ment in paragraph 82. In addition, bearings, clutch facings, and cutter head should be checked for evidence of excessive wear.

Section V. CONTROLS AND INSTRUMENTS

84. Power Switch

The power switch may be located on the motor or on the front of the shelf of the finisher. (See 14, fig. 129.) When power is furnished by a generator, the switch is effective only when the generator is operating.

85. Clutches

a. LANDIS PORTABLE SHOE REPAIR UNIT MODEL 12 K-100 SPECIAL. In this model the finisher has a single clutch control. (See 9, fig. 131.) Lift the handle to engage clutch. Lower the handle to disengage clutch.

b. AMERICAN MODEL L. On the American Model L finisher (fig. 130), the blower, the upper shafts, and the edge trimmer unit have each a clutch control. Engage and disengage clutch as described in *a* above.

c. LANDIS, 100 LINE, MODEL 102. On this model (fig. 129), the blower, the burnisher shaft, the sander shaft, and the edge trimmer unit each have a clutch control. Engage and disengage clutch as described in *a* above.

86. Edge Trimmer Brake

The edge trimmer brake is located in the center of the face of the edge trimmer unit. (See 1, fig. 129.) To stop the motion of the trimmer head after clutch has been disengaged, move brake handle to the left.

87. Edge Setter Friction Heater Control

The edge-setting irons are heated by a friction heater containing an asbestos friction element. The heater has two heating positions. When the control handle (15, fig. 129) is toward the rear, the heater may be left on continuously without overheating. To heat the edge setter quickly, the handle is moved toward the front. In this position the edge setter will overheat in a short time. When the heat control handle is at center between the forward and rear positions, it is at neutral and the heater does not generate heat.

Section VI. OPERATION UNDER USUAL CONDITIONS

88. General

Operation of the finisher is a relatively simple process. The shoe is applied to the various operating wheels of the finisher in succession, until it is trimmed, sanded, and polished.

89. Edge Trimmer (fig. 133)

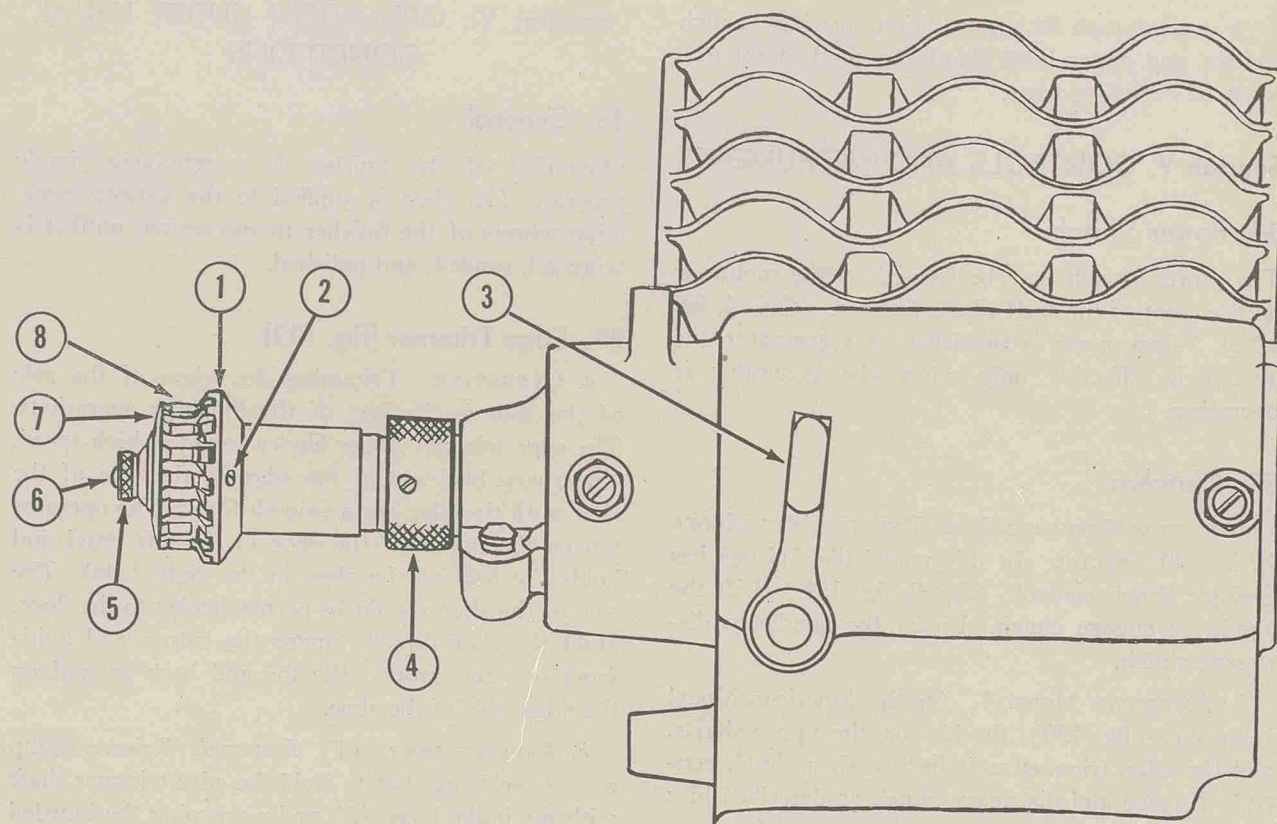
a. OPERATION. Trimming the edges of the sole of the shoe is the first of the finishing operations. The edge trimmer cutter blades rotate at high speed. The sharp blades trim the edge of the sole of the shoe until the edge has a smooth finish. The operator grasps the upper of the shoe in the left hand and holds the heel of the shoe in the right hand. The sole of the shoe should be perpendicular to the floor. Hold the shoe directly under the cutter, and guide from one end around the toe and back around on the other side of the shoe.

b. REPLACEMENT. (1) *Removal.* Release clamp nut. (See 5, fig. 133.) Hold the edge trimmer shaft with the brake lever (3) or by grasping the knurled back guard set collar (4) with the right hand. With the left hand turn the back guard (1) so that the top of it turns toward the operator. When the clamp nut (5) is released, remove cutter (8) and cutter shield (7) with fingers. Most trouble in removing cutters is caused by the cutters fitting too tightly on the shaft. If cutters do not turn on the shaft, it will be difficult to remove the clamp nut (5).

(2) *Installation.* Place cutter (8) on end of shaft. If it will not turn on shaft, remove and examine it for burs. If burs are found, remove them with sandpaper. If all cutters fit tightly and are not burred, polish the shaft slightly with sandpaper until cutters will turn on shaft. When the cutter fits properly on the shaft, push it onto shaft as far as it will go. Place cutter shield (7) on shaft. Tighten clamp nut (5) by holding the back guard set collar with one hand and turning top of cutter away from operator. The cutter back guard (1) should be set so that the face of the guard is even with the inside level of the cutter (8). This adjustment is made with the back guard adjusting screw.

90. Heel Breaster (fig. 134)

a. OPERATION. The heel breaster (1, fig. 134) is a revolving, conical sand wheel which is used to



Ref. No.	Nomenclature
1	Edge trimmer cutter back guard.
2	Edge trimmer cutter back-guard adjusting screw.
3	Brake lever.
4	Edge trimmer cutter back-guard set collar.

Ref. No.	Nomenclature
5	Edge trimmer clamp nut.
6	Edge trimmer clamp screw.
7	Edge trimmer cutter shield.
8	Edge trimmer cutter.

Figure 133. Edge trimmer cutter replacement.

grind an even finish out of the breast of the heel (2) and the heel base of the shoe. The operator grasps the heel and quarter of the shoe with the right hand and holds the vamp and outsole of the shoe with the left hand. The shank of the shoe is held flat against the face of the heel breaster wheel.

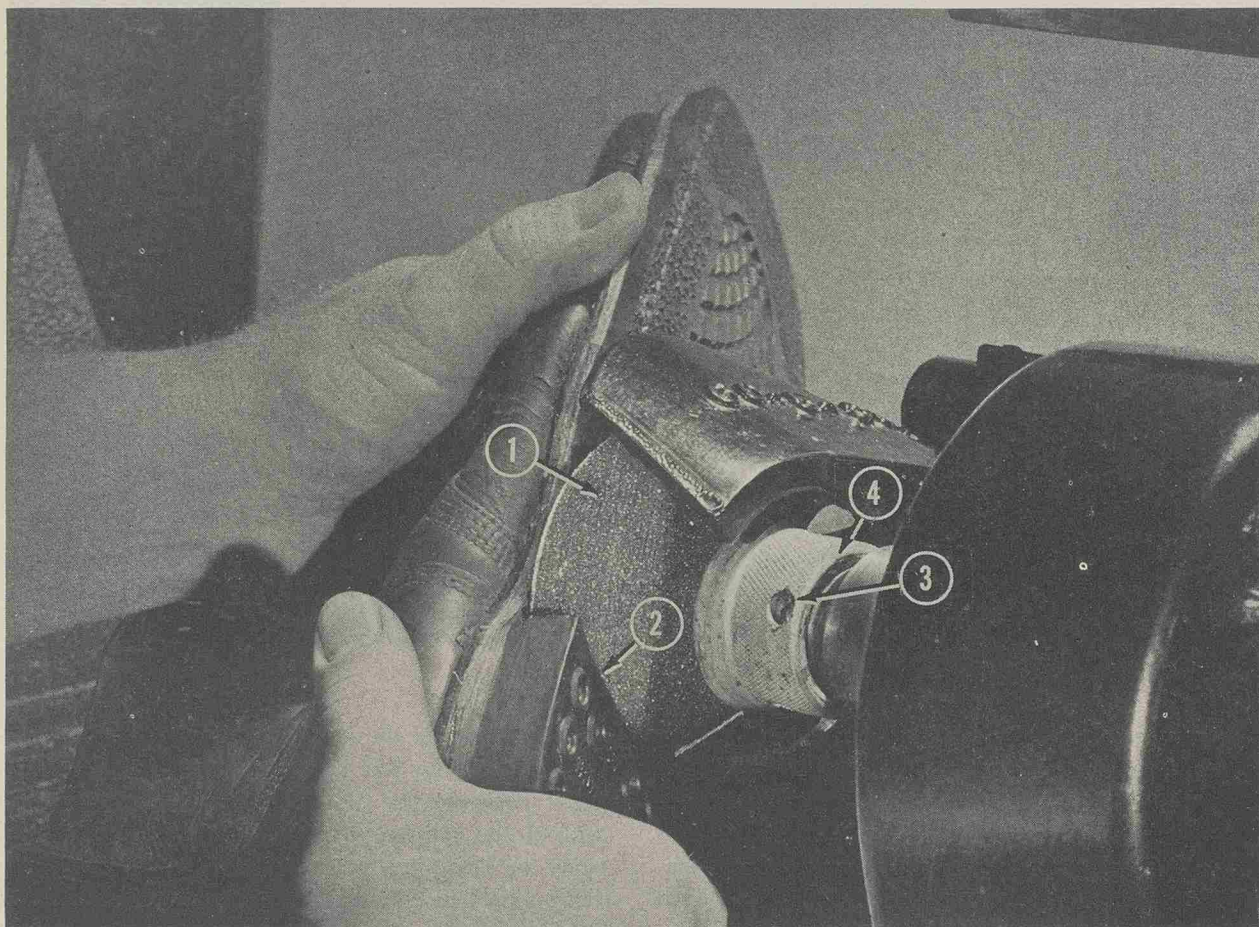
b. REPLACEMENT OF SAND PAPER. Place pin wrench in pinhole (3) of shaft connection (4). Loosen shaft connection by turning top of it down toward the operator. Turn it until sand paper on heel breaster (1) is loose. Remove paper. Place new paper on heel breaster so that the upper flap of the paper passes up around the top of the heel breaster and points to the rear. Turn top of shaft connection (4) down and toward the rear until paper is held securely on heel breaster. Pressure of the heel breaster as it turns against the shoe will

tighten the shaft connection adequately.

91. Heel Sander

a. OPERATION. The heel sander (fig. 135) is a revolving sand wheel which sands the heel of the shoe down to a smooth, even finish. Grasp shoe with right thumb against heel breast of shoe and with fingers along the bottom of the heel. Point toe of shoe forward toward the operator. Guide shoe with left hand grasping quarter of the shoe. Turn the heel of the shoe against heel sander until the heel and heel base of the shoe are evenly finished.

b. REPLACEMENT OF PAPER. (1) *Removal* (fig. 136). When paper becomes so worn that it is no longer effective, it should be replaced promptly so that the wood and felt of the sanding wheel are not damaged. Raise the hood of the heel sander (3,



Ref. No.	Nomenclature
1	Heel breaster.
2	Heel breast.
3	Shaft connection pinhole.
4	Shaft connection.

Figure 134. Heel breaster.

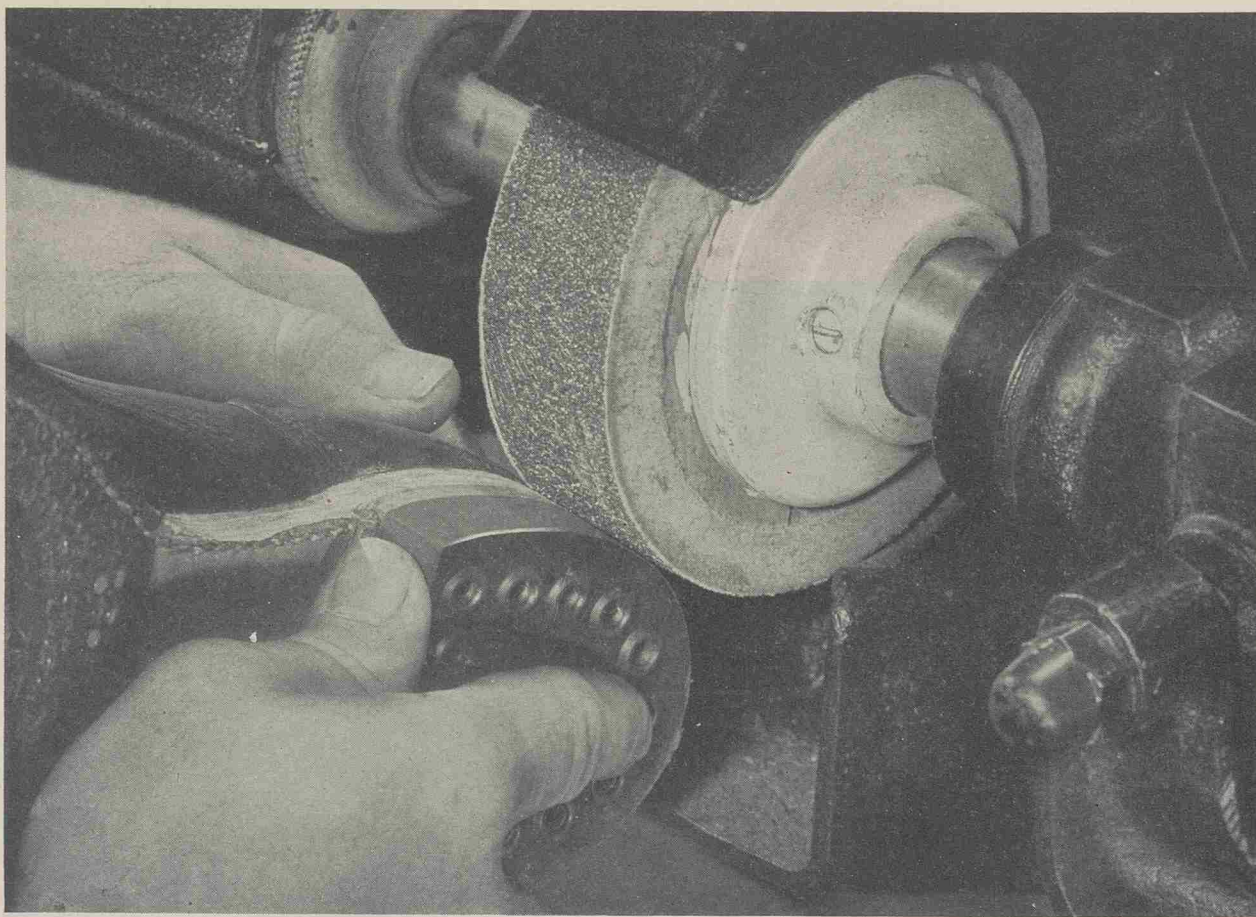


Figure 135. Heel sander operation.

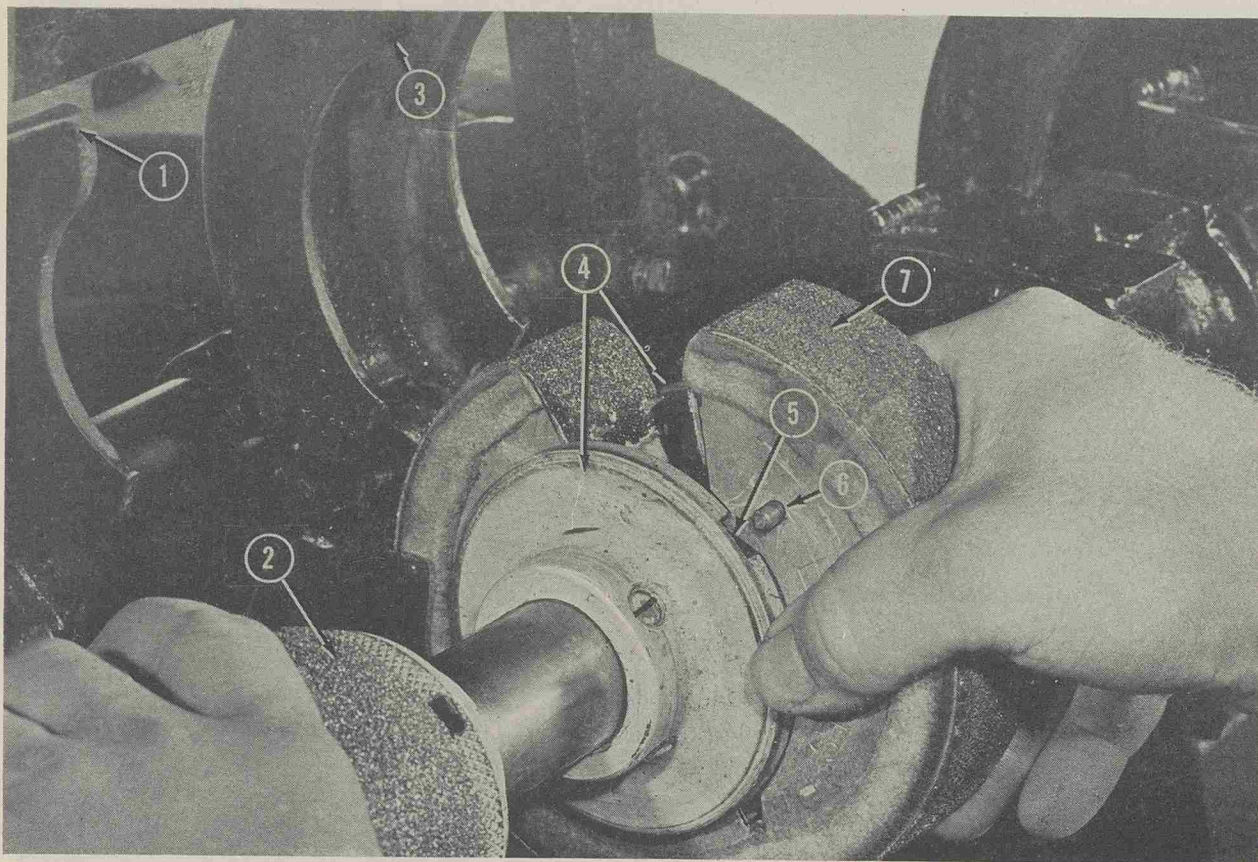
fig. 136) and the hood of the bottom sander (1). Turn upper shaft by hand until the opening joint of the heel sander is turned up and is facing the operator. Grasp bottom sander (2) with left hand to hold shaft securely. With right hand strike downward on lower segment of heel sander (7) to open segments in direction that shaft turns. When segments are loose in the collars (4) turn segments until segment pin (6) in segment coincides with notch (5) in collar. Lift segment up until the working space between the open ends of the segments is sufficient to remove paper. Lift ends of paper off the paper-retaining pins (1, 2, fig. 137) and remove paper from sanding wheel.

(2) *Installation* (fig. 137). Segments of the wheel should not be opened more than 2 inches when paper is being installed. If wheel is opened more than 2 inches and the paper is placed in position on the paper-retaining pins (1 and 2, fig. 137) the paper will be stretched too tight when the wheel is closed and will break down the corners of the segments.

Place one end of the new paper on the paper-retaining pins of the top segment of the wheel. Pass paper over the top of the wheel and down and up around the bottom segment. Fasten loose end of paper on retaining pin (2) in the bottom segment. Turn wheel in collars until segment pin (4) drops into notch (3) in wheel collar (5). Close wheel. Turn top of wheel to the rear and down until it is tight in the collars. Turning wheel to the rear secures it in the collars by turning segment pin into an eccentric groove on the inside of collar.

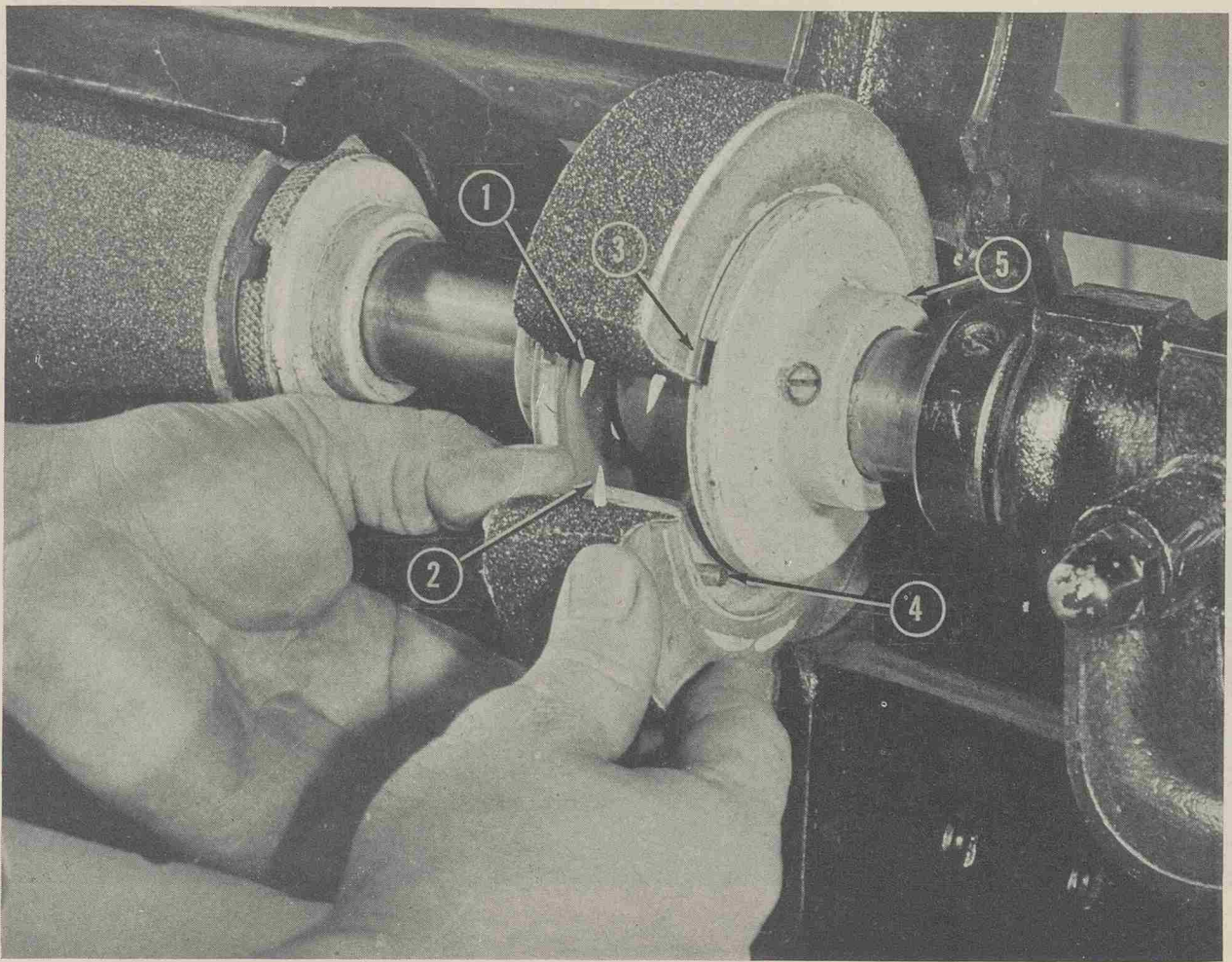
92. Bottom Sander

a. OPERATION. The bottom sander (fig. 138) is a revolving-drum sand wheel which sands down and finishes the shank of a leather soled shoe. Grasp the quarter of the shoe with right hand. Place toe of shoe toward the floor and shank of shoe toward sander. Guide shoe with left hand along the vamp of left side of shoe, holding shank of shoe upon sander.



Ref. No.	Nomenclature
1	Bottom sander hood.
2	Bottom sander.
3	Heel sander hood.
4	Sanding-wheel collars.
5	Retaining notch.
6	Segment pin.
7	Lower segment.

Figure 136. Removal of heel sander paper.



Ref. No.	Nomenclature
1	Upper segment paper-retaining pins.
2	Lower segment paper-retaining pin.
3	Retaining notch in collar.
4	Segment pin.
5	Collar.

Figure 137. Installation of heel sander paper.

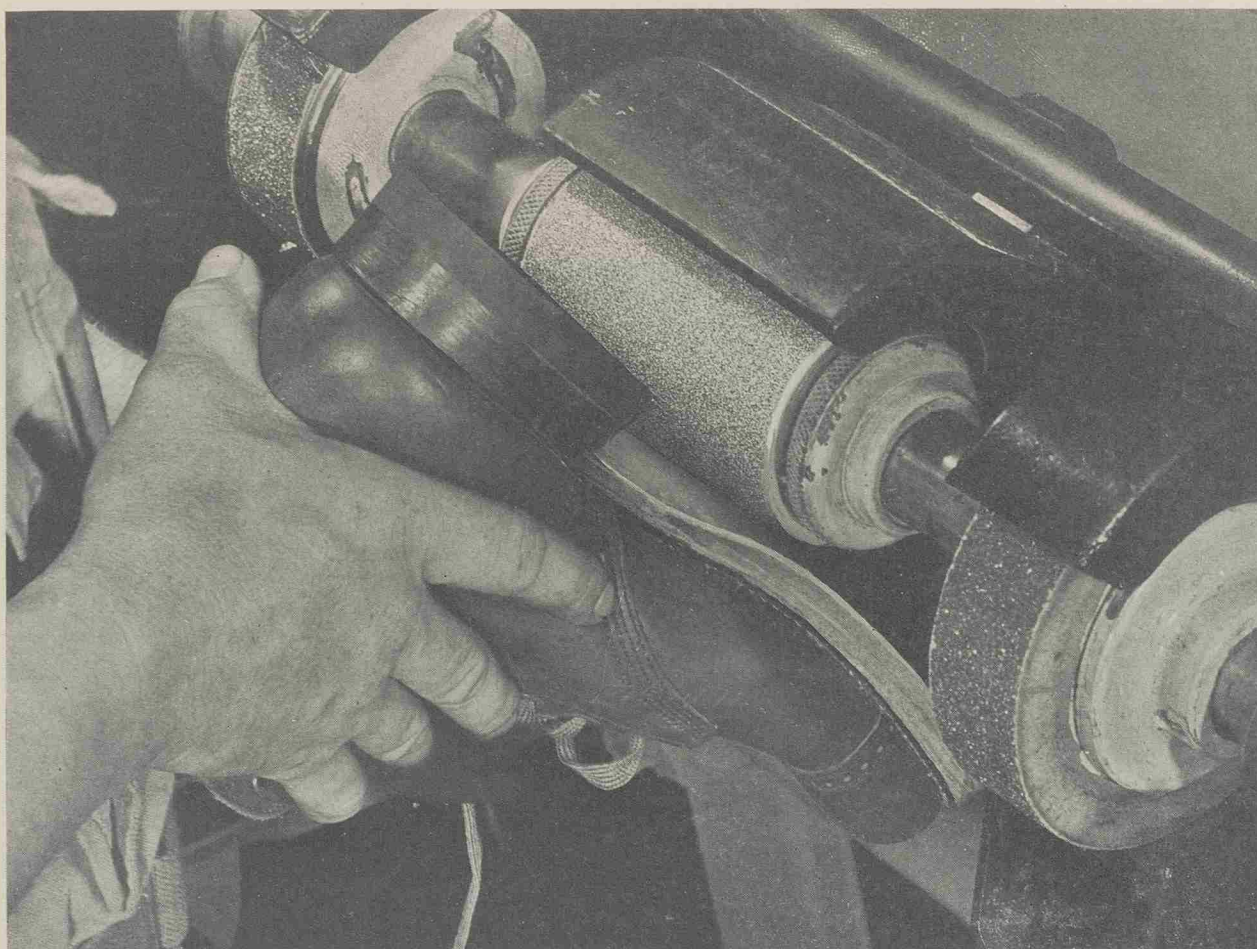


Figure 138. Bottom sander operation.

b. REPLACEMENT OF PAPER. Follow procedure described in paragraph 91*b* for Landis, 100 Line, Model 102.

93. Finishing Brush

a. OPERATION. Ink is applied to the parts of the shoe that require it. The shoe is then held against the revolving finishing brush (fig. 139) until it is dry and polished.

b. REPLACEMENT. See paragraph 120.

94. Burnisher Wheel

a. OPERATION. The burnisher wheel is a cloth covered wheel which rotates with the upper shaft. After burnishing wax is applied to the cloth cover of the wheel, the operator buffs and waxes the edges of the shoe against the rotating wheel.

b. REPLACEMENT. (1) Use spanner wrench (3, fig. 140) to release retaining collar (2) at side of burnisher wheel. Turn top of collar forward and down. Unwrap burnishing cloth (1, fig. 140) from wheel, lifting binding cord (1, fig. 141) free of notch in wheel in which it was anchored.

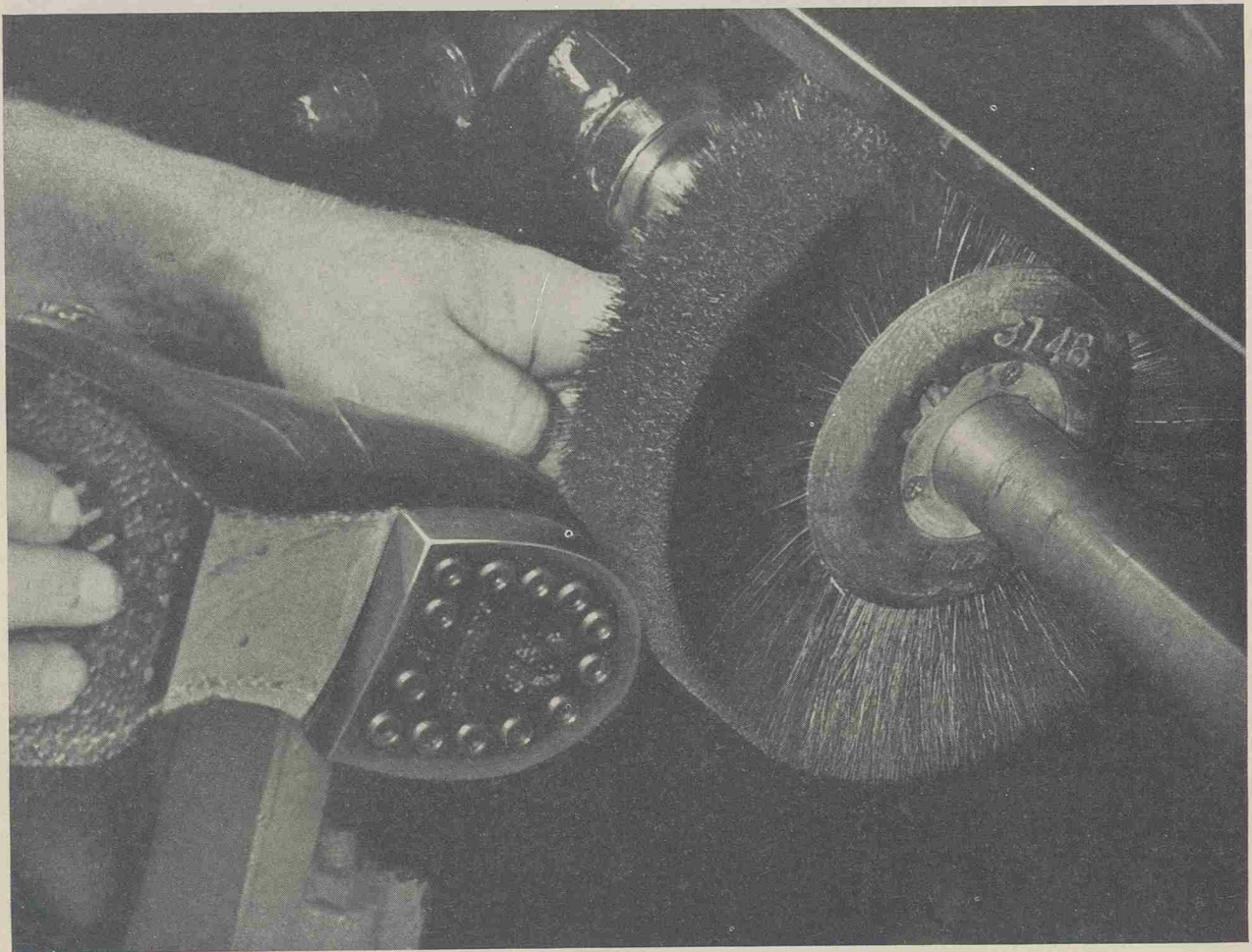
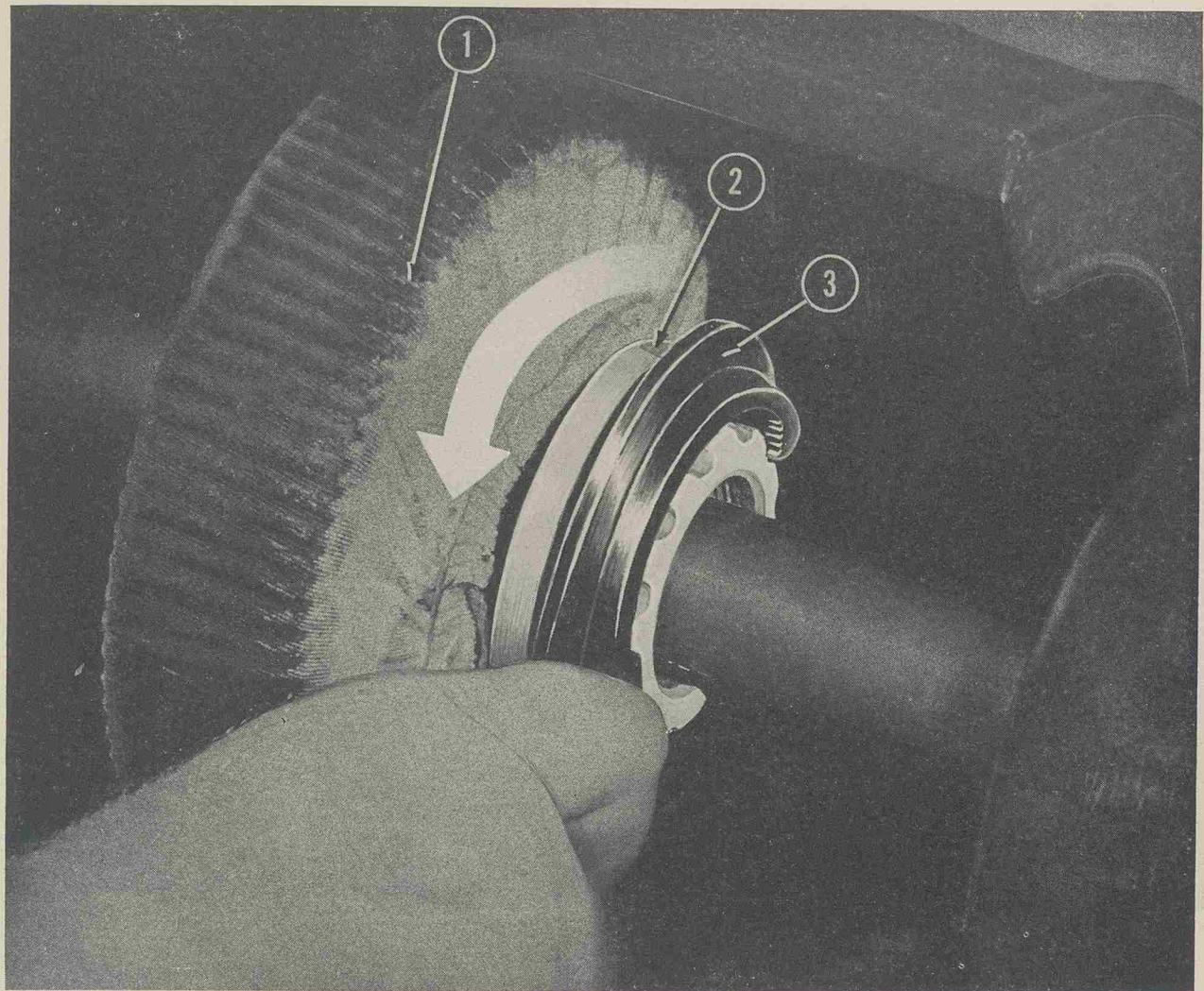
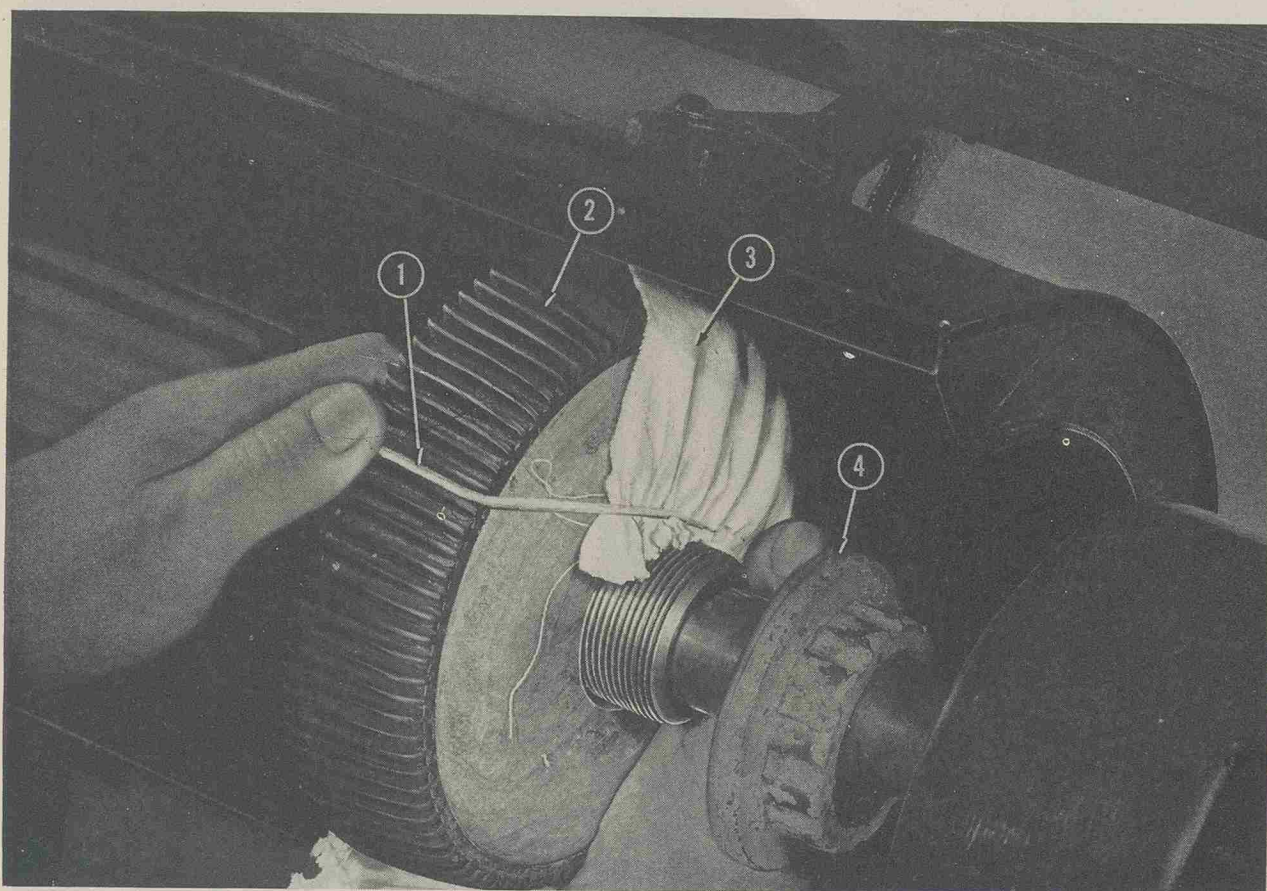


Figure 139. Finishing brush operation.



Ref. No.	Nomenclature
1	Burnishing cloth.
2	Cloth-retaining collar.
3	Spanner wrench.

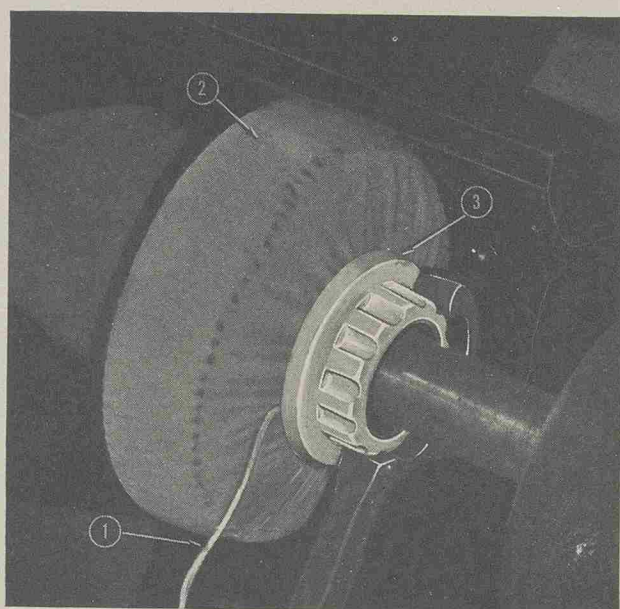
Figure 140. Removing burnishing cloth.



Ref. No.	Nomenclature
1	Binding cord.
2	Burnishing wheel.
3	Burnishing cloth.
4	Cloth-retaining collar.

Figure 141. Applying burnishing cloth.

(2) Place new burnishing cloth (3, fig. 141) on wheel. Anchor binding cord (1, fig. 141) in notch in wheel. Pass cloth over the top of the wheel and down behind it. Bring loose end of cloth up around front of wheel so that when cloth laps on the wheel, the lap will point to the rear when lap is at top of wheel. Turn retaining collar (2, fig. 140) up against wheel so that burnishing cloth and binding cord are secured. (See fig. 142.) Tighten retaining collar (2, fig. 142) with spanner wrench (3, fig. 142) by turning top of collar to the rear. Cut free end of binding cord close to retaining collar.



Ref. No.	Nomenclature
1	Binding cord.
2	Burnishing cloth.
3	Cloth-retaining collar.

Figure 142. Securing burnishing cloth.

(3) When burnisher wheel is in motion, apply burnishing wax to the covered burnisher wheel. (See fig. 143.)

95. Edge Setter (fig. 144)

a. OPERATION. The rotating, friction heated edge setter (1, fig. 144) applies hot wax to the edges of the soles of the shoe to darken and waterproof them. The edge setter is heated by the friction created against an asbestos friction element, the heat being controlled by the heat control handle (2). When the handle is straight up, the friction element is in

neutral and no heat is generated. Pushing the control handle to the rear places the heater in operating position. In this position the heater will generate enough heat for proper operation and will not overheat under continuous use. To warm the friction heater quickly, pull the control handle (2) forward. This position should be held only until proper operating temperature is reached and then the handle should be pushed to the rear. The friction element will overheat if control handle is left in forward position too long. When the edge setter (1) is at the proper operating temperature, grasp the shoe with both hands and press edges of sole of shoe against the rotating edge setter. Hold shoe in such a way that fingers cannot slip against the whirling edge setter. Turn shoe until entire edge of the sole is evenly finished.

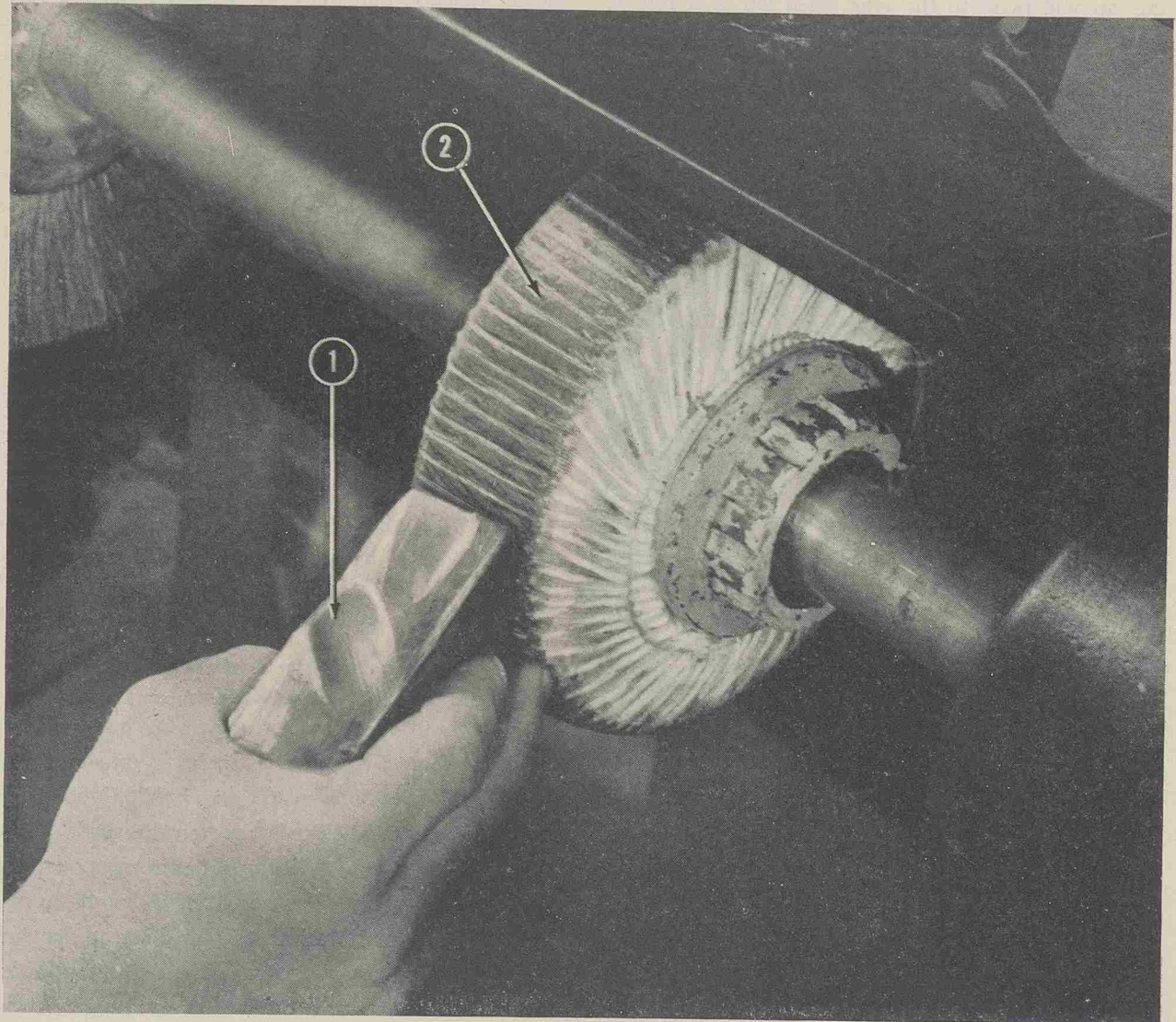
b. REPLACEMENT. (1) *Removal.* Set heat control handle (2, fig. 144) in neutral (straight up) and press heat control unit away from edge setter (1) as far as it will go. Grasp edge setter (1) and turn it forward and down until eccentric groove within it is released from pin on shaft. As edge setter is turned, pull it toward outward end of shaft. When notch on side of edge setter coincides with pin on shaft, edge setter will slide off end of shaft.

(2) *Installation.* Place edge setter (1, fig. 144) raised side inward, against outward end of shaft and then turn to the rear and down. When notch in side of edge setter coincides with pin on shaft, edge setter will slide into place on shaft. Continue to turn edge setter until it is tight on the shaft. Press heat control handle (2) toward edge setter until it is snug against it. Press heat control handle to rear and then return it to neutral position to be sure friction element is in contact with edge setter which will become tighter in use as it turns against the shoe pressed against it.

Section VII. OPERATION UNDER UNUSUAL CONDITIONS

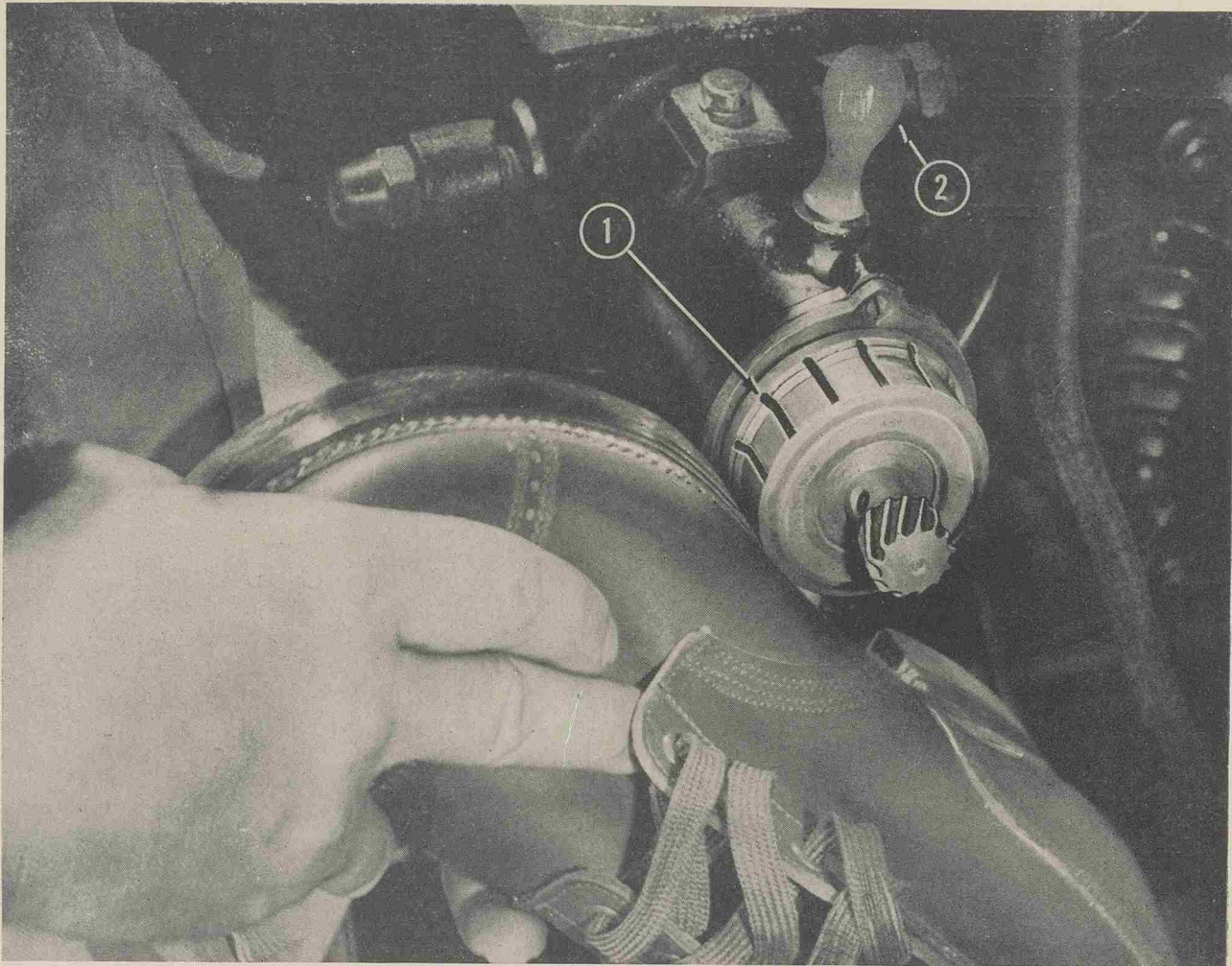
96. General

The simple, straight line construction and operation of the finishing machine make it relatively unaffected by any extremes in humidity or temperature that the operator could endure.



Ref. No.	Nomenclature
1	Burnishing wax.
2	Burnisher wheel.

Figure 143. Waxing burnisher wheel.



Ref. No.	Nomenclature
1	Edge setter.
2	Heat control handle.

Figure 144. Edge setter operation.

97. Operation under Extremely Dusty or Dirty Conditions

Where the air is extremely dusty or the terrain very muddy, some precautions should be taken in the operation of the finisher. Shoes should be free of all removable dirt before they are accepted in the shoe repair installation. If this precaution is not feasible, clean all dirty shoes before they enter the shoe repair process. Dirt and grit are especially damaging to the edge trimmer cutter and the finisher bearings. Check oil reservoirs at each lubricating period to see that they are not clogged and are feeding oil to their bearings. Lubricate

more often than prescribed in paragraphs 102 and 103 if dust and dirt become so prevalent as to increase friction in bearings.

Section VIII. DEMOLITION TO PREVENT ENEMY USE

98. General

In a theater of war, where control of territory may change hands swiftly, it is necessary for the organization using this equipment to know how to demolish it quickly if its capture is imminent.

99. Procedures

a. REMOVAL. Every attempt should be made to move this equipment into a safe position. If removal is impossible, the finisher and its supplies must be so thoroughly demolished that nothing will be useful to the enemy.

b. DESTRUCTION. Use an ax or sledge to smash motor, clutches, finishing wheels, shaft bearings, blower, and edge trimmer assembly beyond repair. Break or bend main shaft and upper shafts. Smash the cast iron legs and junctions of the frame. Remove belts. Burn all inflammable supplies. Bury tools, spare parts, and noncombustible supplies.

PART THREE

MAINTENANCE INSTRUCTIONS

Section IX. SPECIAL ORGANIZATION TOOLS AND EQUIPMENT

100. Tools

Tools furnished with the finishing machine are shown in figure 132.

101. Supplies

The using organization is issued a 6 months' supply of the following spare parts and supplies:

Description	Quantity
F. S. heel sander (wood and felt).....	2
Bottom sander (wood and felt), 9 inch.....	2
Belting and hooks (complete set).....	1
Edge trimmer retaining screws.....	2
Grease, lubricating, cup, medium grade	12 pounds..
Oil, lubricating, No. 300A.....	10 gallons..
Brushes, inking, four-row.....	10
Wheels, abrasive	40
Stones, sharpening	15
Cloth and paper, combination, abrasive	200 sheets..
Cloth and paper, combination, heel breaster	360 pieces..
Ink, burnishing, brown.....	7 gallons..
Wax, shoemaker's, finishing, brown...cakes..	150
Covers, roll, shoe finishing.....	200
Cutters, edge-trimming machine.....	24
Shields, cutter	12

Section X. LUBRICATION

102. Lubrication Chart

a. The lubrication charts presented in figures 145 and 146 prescribe first and second echelon lubrication maintenance.

b. The service intervals specified in the lubrica-

tion charts are for normal operating conditions. Under extreme conditions, such as excessively high or low temperatures, prolonged periods of high speed, continued operation in sand or dust, immersion in water, or exposure to moisture, the intervals should be reduced. Failure to reduce them may result in malfunctioning or damage to the machine.

c. The lubricants prescribed in the KEY for use on this machine are to be used at all temperatures.

103. Detailed Lubrication Instructions

a. LUBRICATION EQUIPMENT. Each finishing machine is supplied with lubrication equipment adequate to maintain it. Make certain the lubrication equipment is cleaned both before and after use. Operate the equipment carefully and in such a manner as to insure a proper distribution of the lubricant.

b. POINTS OF APPLICATION. Oilholes and grease cups are readily located by reference to the lubrication chart, which is supplemented by individual photographs of the points of lubrication. (See figs. 147 to 152, inclusive.) Wipe all points and surrounding surfaces clean before applying the lubricant.

c. CLEANING. Use dry cleaning solvent or Diesel fuel oil to clean or wash all parts. Use of gasoline for this purpose is prohibited. After washing, dry all parts thoroughly before applying lubricant.

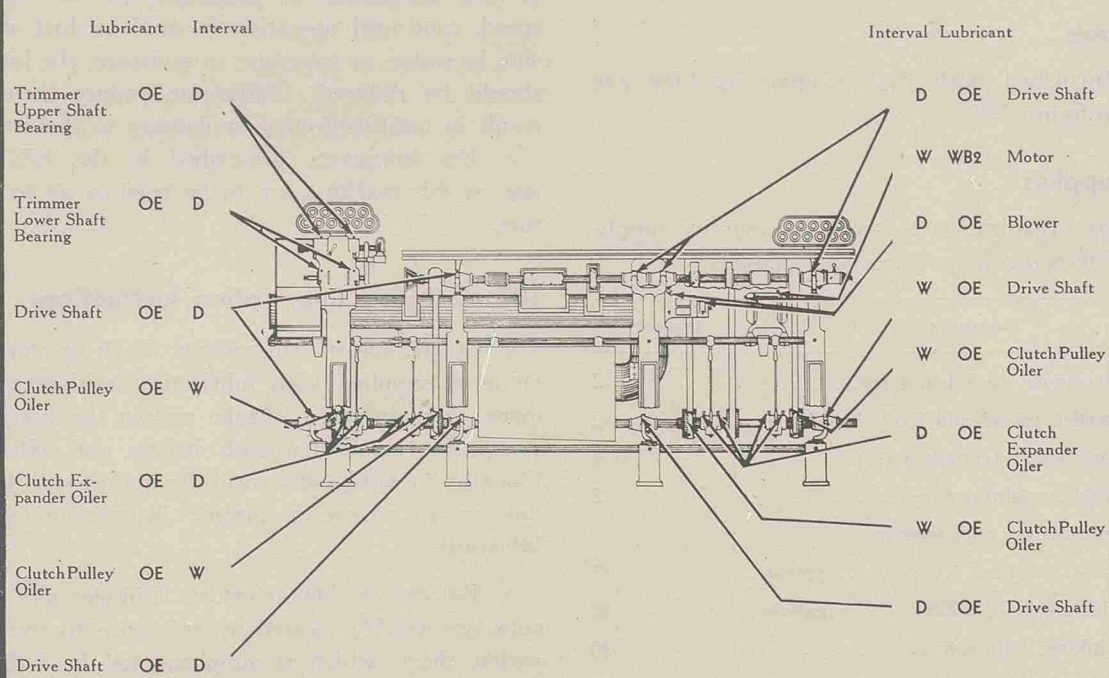
d. LUBRICATION NOTES ON INDIVIDUAL UNITS AND PARTS. (1) *Trimmer*. Every day lubricate the two upper and the two lower shaft bearings with oil. Pour oil into the upper oil cup until it runs from the lower oilhole which opens out of the reservoir at the oil level.

(2) *Drive shaft*. Every week lubricate the eight drive shaft bearings by adding oil to the top of the upper oilholes.

(3) *Clutch expander oilers*. Every day lubricate the four clutch expander outer sleeve oilers and the four clutch expander inner sleeve oilers with

LUBRICATION CHART

MACHINE, FINISHING (LANDIS—102 / AMERICAN—"L")



—KEY AND NOTES—

LUBRICANT	INTERVAL
OE—OIL, engine—OE 10	D.... Daily
WB2—GREASE, general purpose, No. 2	W.... Weekly

Clean parts with SOLVENT, dry-cleaning or OIL, fuel, Diesel.
Dry before lubricating.

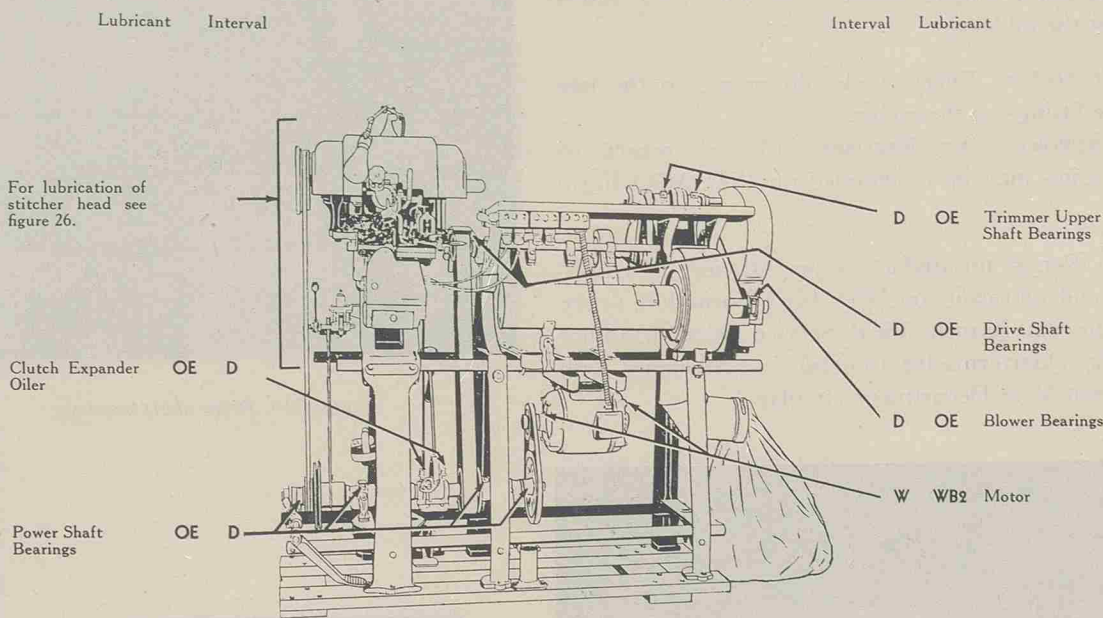
Reduce intervals under severe operating conditions. Extend when not in use.

Most of the oil reservoirs indicated above are equipped with secondary oil holes. Pour oil into the upper oil cup until the oil runs from the lower oil hole, which opens out of the reservoir at the oil level.

Figure 145. Lubrication chart—Landis 102 and American L.

LUBRICATION CHART

PORTABLE SHOE REPAIR UNIT (LANDIS MODEL 12 K-100 SPECIAL)



—KEY AND NOTES—

LUBRICANT	INTERVAL
OE—OIL, engine—OE 10	D..... Daily
WB2—GREASE, general purpose, No. 2	W..... Weekly

Clean parts with SOLVENT, dry-cleaning or OIL, fuel, Diesel. Dry before lubricating.

Reduce intervals under severe operating conditions. Extend when not in use.

Most of the oil reservoirs indicated above are equipped with secondary oil holes. Pour oil into the upper oil cup until the oil runs from the lower oil hole, which opens out of the reservoir at the oil level.

Figure 146. Lubrication chart—Landis 12 K-100 Special.

oil. Every week these reservoirs should be drained and filled to the top of the reservoir with new oil.

(4) *Clutch pulley oilers.* Every week add oil to the four clutch pulley oilers until the reservoir is filled and the wicks are saturated.

(5) *Blower.* Every week lubricate the blower bearings by adding oil to the two blower oil cups. Pour oil into the upper oil cup until oil runs out of the lower oilhole which opens out of the reservoir at the oil level.

(6) *Motor.* Every week add grease to the two grease fittings on the motor.

c. REPORTS AND RECORDS. (1) A record of lubrication may be maintained on WD AGO Form 460.

(2) Report unsatisfactory performance of equipment and lubricants on WD AGO Form 468, to the Reclamation Branch, Field Service Division, Office of The Quartermaster General, in accordance with pertinent War Department circulars.

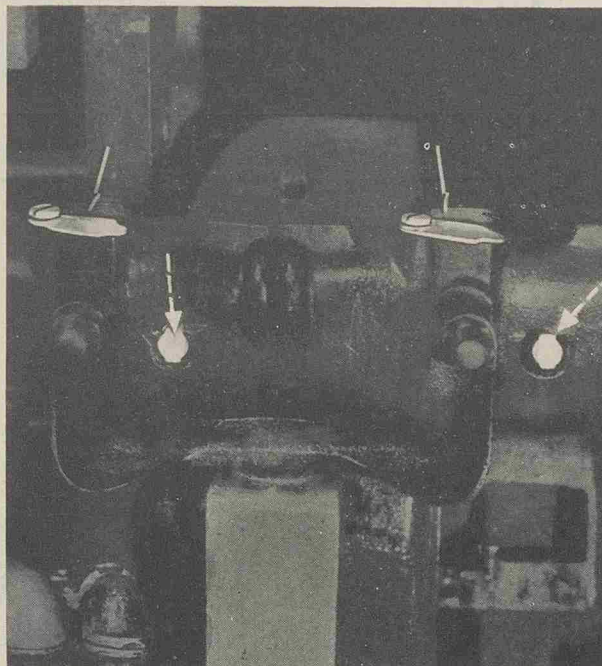


Figure 148. Drive shaft bearings.

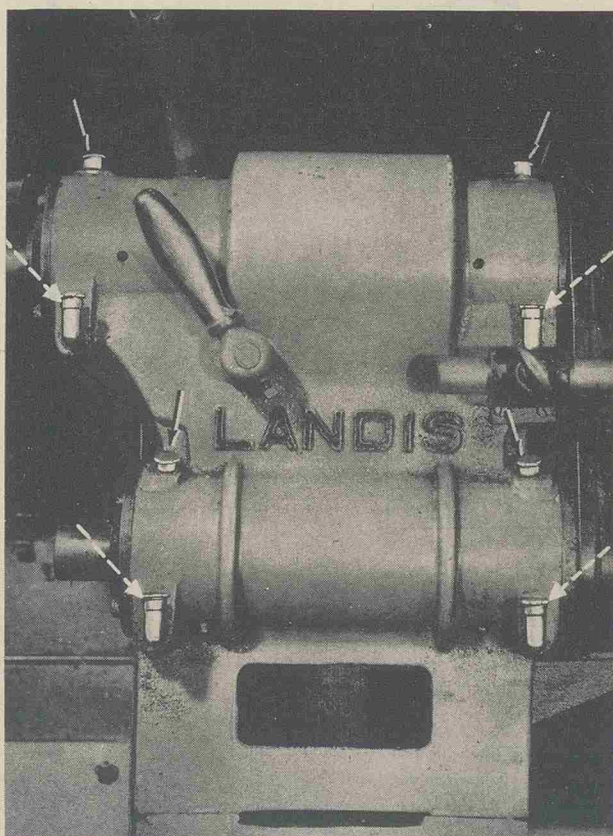


Figure 147. Edge trimmer bearings.

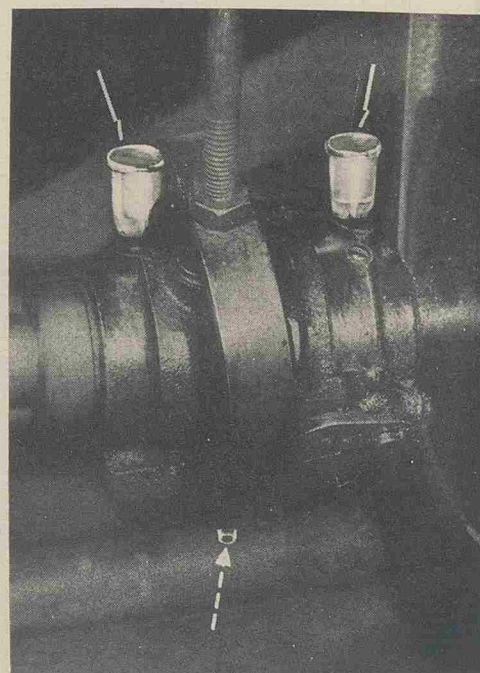


Figure 149. Clutch expander.

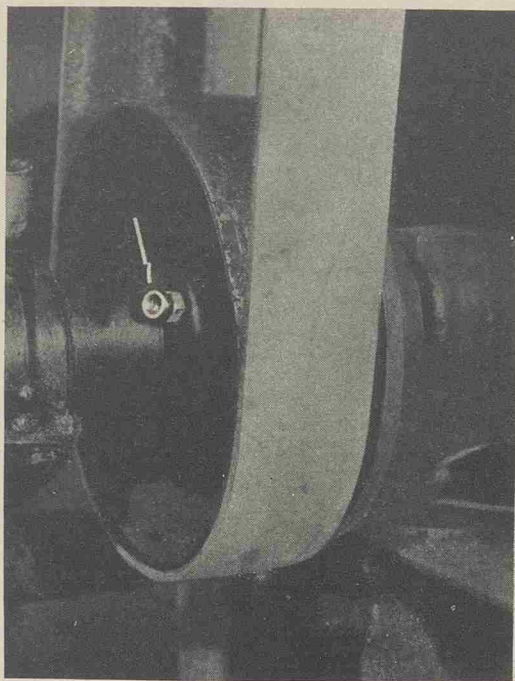


Figure 150. Clutch pulley.

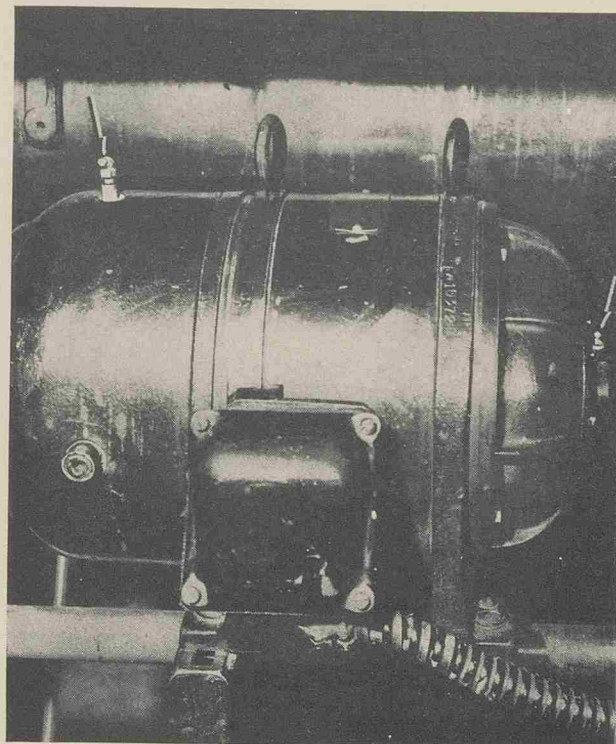


Figure 152. Motor.

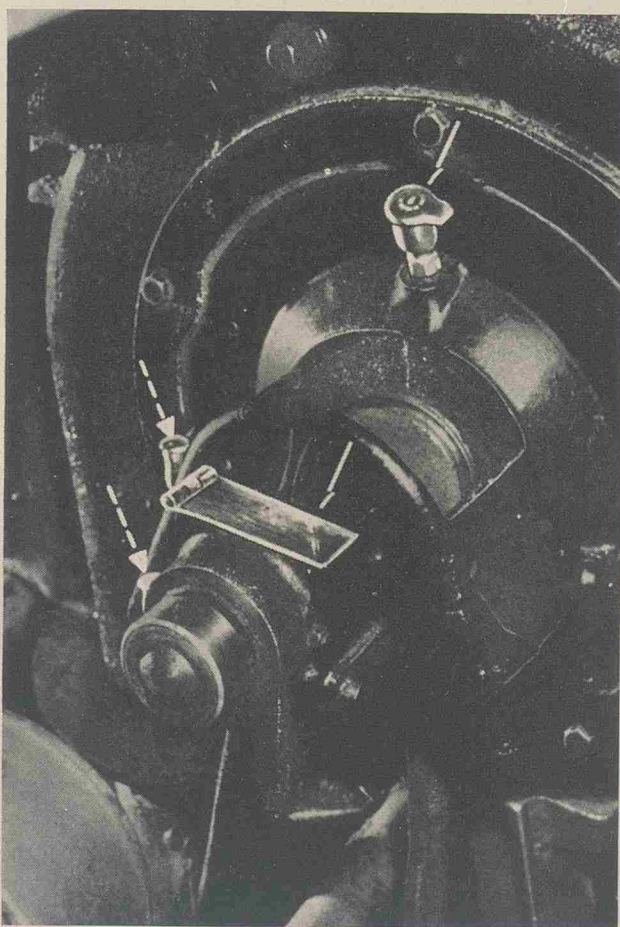


Figure 151. Blower.

Section XI. PREVENTIVE MAINTENANCE

104. General

Preventive maintenance services are performed by the maintenance personnel of the using organization. These services consist generally of before-, during-, and after-operation services performed by the operator; and the scheduled weekly and monthly services performed by organizational maintenance personnel.

105. Operator Maintenance (First Echelon)

a. BEFORE-OPERATION SERVICE. (1) *General.* This service is performed primarily to see that the machine has not been damaged or tampered with since the after-operation service (*c* below) was performed. In addition, it includes such services as are required to put the machine in proper condition for operation.

(2) *Lubrication.* Lubricate the points of the machine as prescribed in figures 147 through 152.

(3) *Bearing alignment.* Remove belts and turn shafts by hand. All shafts should turn freely. Binding of any shaft should be reported to unit mechanic. If bearing alignment is satisfactory, replace belts.

(4) *Belt alignment.* Start motor. Belts should ride evenly and center on crest of their pulleys. Belts should run between pulleys in a straight line.

(5) *Clutch action.* Engage each clutch with the clutch control lever. Clutch should engage smoothly and completely. Disengage clutch. Power transmission should cease smoothly and quickly. If clutch drags or binds or does not engage completely, notify unit repairman and adjust as described in paragraph 111.

(6) *Hood clearance.* Check hoods over finishing wheels to see that they are secure in their hinges. Make certain that clearance between finisher wheels and their hoods is adequate.

(7) *Changing wheel coverings.* Examine the paper or abrasive cloth on the sanders and the cloth cover of the burnisher. Sandpaper should carry enough grit to be effectively abrasive, and paper should be sturdy enough to protect wood and felt of sanding wheels. The burnishing wheel cover should be in such condition that it will take the burnishing wax and will protect the burnishing wheel. When necessary, change wheel covers as described in paragraphs 91, 92, and 94.

b. DURING-OPERATION SERVICE. (1) *General.* An operator familiar with his machine quickly notices small changes in the sound or feel of its operation. If such a change is noticed, the operator should stop the machine and locate the cause by turning the machine over slowly and closely observing the operation of its parts.

(2) *Clutch action.* Clutches on finishing machine are relatively simple. Once correctly adjusted, they should cause little further trouble. They should engage and disengage smoothly and completely. If they do not, they should be adjusted by unit mechanic according to instructions in paragraph 111. Clutches are commonly blamed for a slippage which actually occurs in the belting on the machine.

(3) *Belt tension.* Belt tension may slacken so much that finishing shafts run below speed when shoes are pressed against finishing wheels. This condition is most likely to occur where humidity of air is high or when a new belt has been run in and has loosened. Belt tension and alignment should be adjusted by unit mechanic as described in paragraph 122.

c. AFTER-OPERATION SERVICE. (1) *General.*

In the after-operation service the operator inspects his machine for any deficiencies which may have developed during operation. He corrects those which he is permitted to handle and reports any other deficiencies to the unit mechanic or the authority responsible for maintenance of the finishing machine. The operator also performs those services on the machine which arise as a result of normal operation. After-operation service is designed to leave the machine ready for operation whenever it may be needed.

(2) *Cleaning dust collector bag.* (a) *General.* When the finishing machine is installed in van type trailers, the discharge pipe from the blower passes through the floor of the trailer and discharges dust outside the trailer. Instructions included here apply to finishing machines operating in fixed installations.

(b) *Cleaning procedure.* When blower fan is not running, shake dust collector bag and remove cleaning drawer. To shake the dust collector bag properly, slap sides of bag against sides of dust collector by pushing the shaker handle in and allowing the bag to fall away from the collector screen. Then snap shaker handle forward and back with a slight pause at the end of each stroke. This procedure gives the bag a rocking motion, slapping it from front to rear against collector screen. Thorough beating of the bag causes the dust to fall to bottom of dust collector. Start blower fan and run it a few seconds to blow dust into the clean-out drawer. Stop blower fan. Repeat this shaking and blowing operation two or three times at each cleaning. Under normal operating loads, the bag should be shaken about twice a day. Empty clean-out drawer when full—about once a day in normal operation.

(3) *Bearing alignment.* See a(3) above.

(4) *Belt alignment.* See a(4) above.

(5) *Clutch action.* See a(5) above.

(6) *Hood clearance.* See a(6) above.

(7) *Changing wheel coverings.* See a(7) above.

106. Organization Maintenance (Second Echelon)

a. GENERAL. Regularly scheduled maintenance inspections and services are a preventive maintenance function of the using unit. They are the responsibility of commanders of the operating organizations or installations.

b. FREQUENCY. The intervals between the pre-

ventive maintenance services listed here are considered a minimum requirement for the normal operation of the machine. Under unusual operating conditions, such as extremely dirty surroundings, it may be necessary to perform certain maintenance services more frequently.

c. **FIRST ECHELON PARTICIPATION.** The operator should be at his machine and assist the unit mechanic while second echelon preventive maintenance services are performed.

d. **PROCEDURES.** (1) *Weekly.* (a) *Running tests.*

1. *Belts.* Belts should run over crest of pulleys, without creeping from side to side. They should run in straight line from one pulley to the other and should be tight enough so that when work is pressed against finishing wheels, they do not slip and allow loss of motion in finishing shaft. (For adjustment of belts see par. 122.)

2. *Clutches.* Engage and disengage each clutch. It should engage and disengage smoothly and completely. Power transmission should be continuous and even. (For adjustment of clutches see par. 111.)

(b) *Hand operation tests.*

1. *Bearings.* Remove belts. Turn main shaft and finishing shafts by hand. Shafts should turn freely without binding. Bearings should not be warm to the touch after machine has been operated. Shafts should be free from end play. Check shaft set collars to see that they are tight and in correct position in relation to shaft bearings. If binding is found in bearings, adjust as described in paragraph 82c.

2. *Finishing wheel hoods.* Check hoods to see that they are secure in their hinges. Hoods should clear finishing wheels in order not to damage the moving wheels.

3. *Motor.* See that housing and support of motor are clean. Check alignment of motor pulley and power shaft pulley. Unit mechanic should not attempt to repair mechanical failure within the motor.

(2) *Monthly tests of nuts and bolts.* Check tight-

ness of all nuts and bolts on machine. Normal vibration of the finishing machine in operation may loosen nuts and bolts enough to cause failure to operate or damage to the machine.

Section XII. TROUBLE SHOOTING

107. General

This section contains trouble shooting information which can be of help in determining and removing the causes of trouble that may develop in this machine. The principal symptoms of trouble are loss of motion and excessive vibration. Paragraph 108 lists the causes for loss of motion and their remedies. Paragraph 109 lists the causes for excessive vibration and their remedies.

108. Causes and Remedies for Loss of Motion

Possible cause	Remedy
Slipping clutch	Check engagement of clutches and adjust if necessary. (See par. 111.)
Slipping belts	Check tensions of belts. Start with power shaft drive belt. (See 21, fig. 129.) Then check remaining belts and tighten if necessary. (See par. 122.)

109. Causes and Remedies for Excessive Vibration

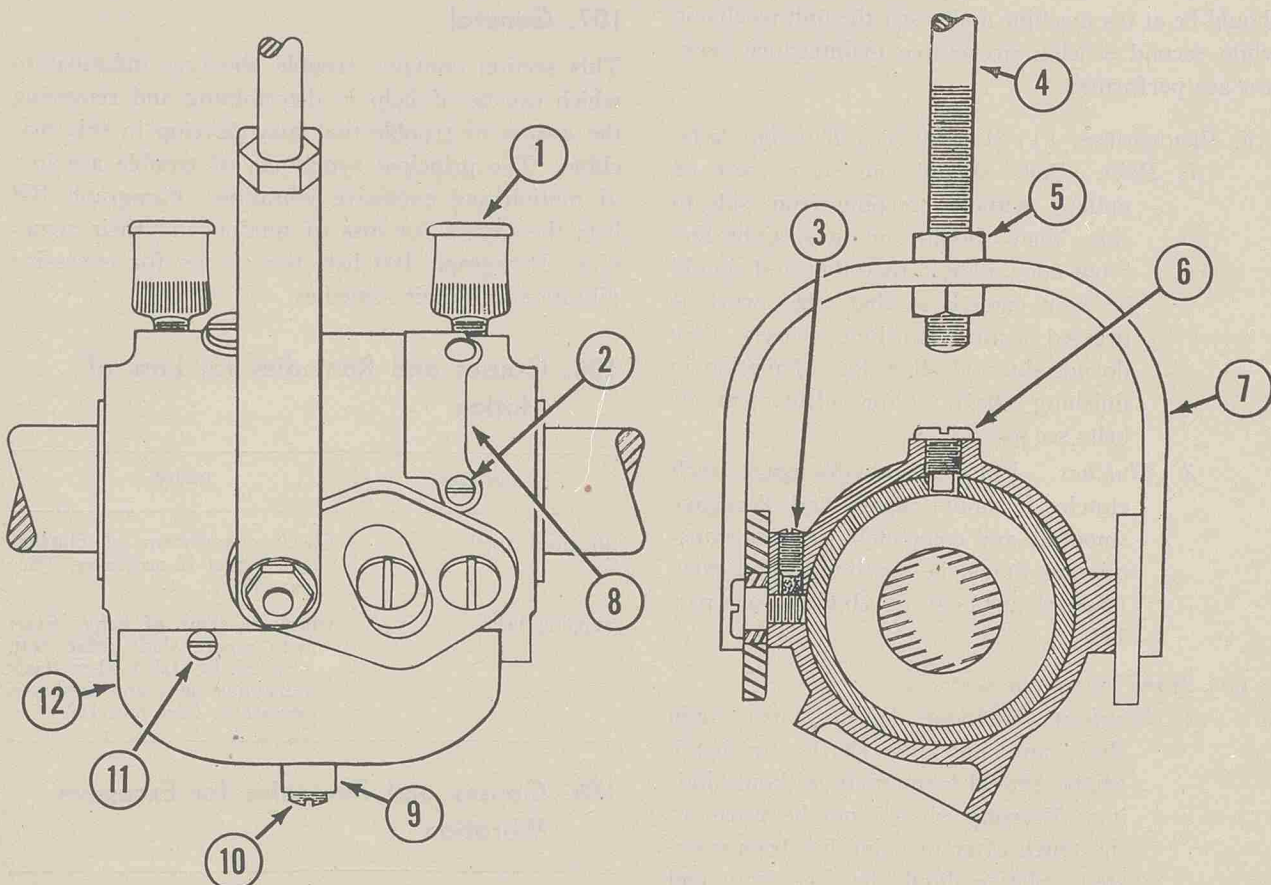
Possible cause	Remedy
Unbalanced condition due to improper position of wheels on finishing shaft.	Engage clutch of each finishing shaft separately. If shaft vibrates excessively, adjust finishing wheels on it so work load on shaft is evenly distributed.
Binding of bearings on shaft.	Remove belts. Shafts should turn freely by hand. If shaft binds in bearing, align bearings on that shaft. (See par. 82.)
Badly worn or poorly patched belt.	Check condition of all belts. One at a time, remove belts which are in such poor condition that they might be causing excessive vibration. Operate machine with defective belt removed. If vibration is no longer present, replace old belt.

Section XIII. CLUTCH ASSEMBLY

110. Description

Clutches on Landis, 100 Line, Model 102 and American Model L finishing machines are similar in

operation but slightly different in construction. The Landis finisher has a friction disk clutch (fig. 153) and the American finisher has a friction cone clutch (fig. 154).

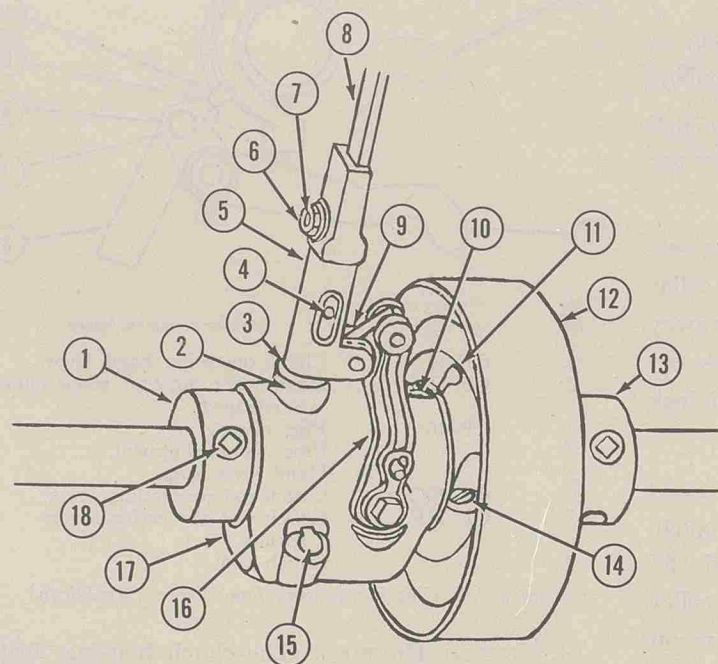


① Side view.

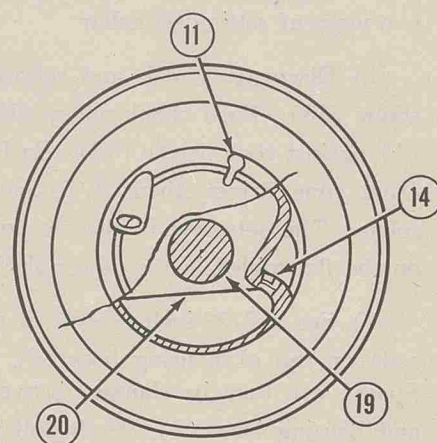
② End view.

Ref. No.	Vendor's part No.	Vendor's nomenclature
1	7-913N	Clutch expander inner sleeve oiler.
2	7-313NA	Clutch body dust guard setscrew.
3	7-313L	Clutch expander cam roll stud set-screw.
4	7-13U	Clutch expander rod.
5	7-313U	Clutch expander rod adjusting nut.
6	7-313LA	Clutch expander sleeve screw.
7	7-13R	Clutch expander fork.
8	7-613NA	Clutch body dust guard.
9	7-113L	Clutch drain plug bushing.
10	7-913L	Clutch oil drip pan plug.
11	7-313LB	Clutch oil drip pan setscrew.
12	7-613L	Clutch oil drip pan.

Figure 153. Clutch (Landis 100 Line model 102).



© External view.



© Sectional view.

Ref. No.	Vendor's part No.	Vendor's nomenclature
1	CP-19	Clutch set collar (with screw).
2		Clutch housing boss.
3		Positioning point "x" for spacer.
4	CP-13C	Stop pin.
5	CP-13	Rod end.
6	CP-13H	Jam nut.
7	CP-13G	Clutch rod connecting screw.
8		Clutch rod.
9	CP-13D	Link.
10		Witness mark on housing.
11		Witness mark on pulley.
12	CP	Clutch pulley.
13	CP-15	Cone driver.
14		Pipe plug for oiling pulley.
15		Oil cup.
16	CP-11	Clutch yoke.
17		Clutch housing.
18		Clutch set collar setscrew.
19		Power shaft.
20		Oil level.

Figure 154. Clutch assembly (American).

III. Adjustment (fig. 154)

There are four basic adjustments on the clutch which must be made correctly and in proper sequence to secure efficient clutch operation.

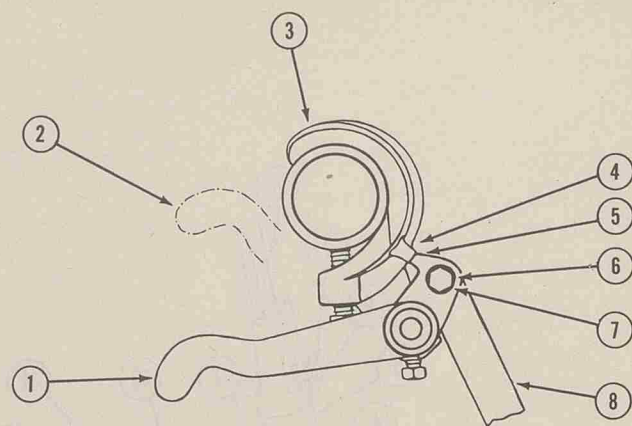
a. Cone driver. Set cone driver (13, fig. 154) so that clutch pulley (12) lines up with top shaft pulley.

b. Set collar. Set the set collar (1) so that clutch will have proper release when disengaged. There are two ways of setting set collar.

(1) Disengage clutch and release set collar set-screw (18). Push clutch pulley (12) and set collar (1) against cone driver (13). Back set collar away from cone driver about 1/16 inch and lock set collar. The setscrew in the set collar should lock on the flat milled in the power shaft.

(2) Set a 7/32-inch spacer (a square or round rod) on top of housing boss (2). Engage clutch. Spacer will then be clamped between rod end (5) and housing boss (2). Push pulley and set collar against cone driver. Lock set collar setscrew on milled flat in power shaft. Use of the 7/32-inch spacer establishes a definite release of clutch pulley when clutch is disengaged. Release should be a full 1/16 inch.

c. CLUTCH AND CONE DRIVER. The pipe clamp bracket should be set so that the bottom of cored slot in rod end (5) touches stop pin (4) in housing post, allowing clutch to swing away from cone driver when clutch is disengaged. To make this adjustment, disengage clutch when power shaft is running. Release pipe clamp (3, fig. 155) and pull clutch rod (8, fig. 154) up so that rod end (5) is against stop pin (4). Set pipe clamp on top pipe so that pulley swings away from cone driver (13). Turn pipe clamp on pipe until the stop (5, fig. 155) on hand lever touches abutment on pipe clamp. Lock pipe clamp. The purpose of the above adjustment is to bring the rod end into proper position and then to set stops on pipe clamp and hand lever to a position in accordance with that of the rod. When the power shaft is running and the clutch is disengaged, the clutch pulley should ride against the set collar.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	CP-17	Clutch-operating hand lever.
2	CP-17	Hand lever position when clutch is engaged.
3	CP-16	Pipe clamp.
4		Pipe clamp abutment.
5		Hand lever stop.
6	CP-17C	Clutch rod connecting screw.
7	CP-17E	Clutch rod connecting screw spring.
8		Clutch rod.

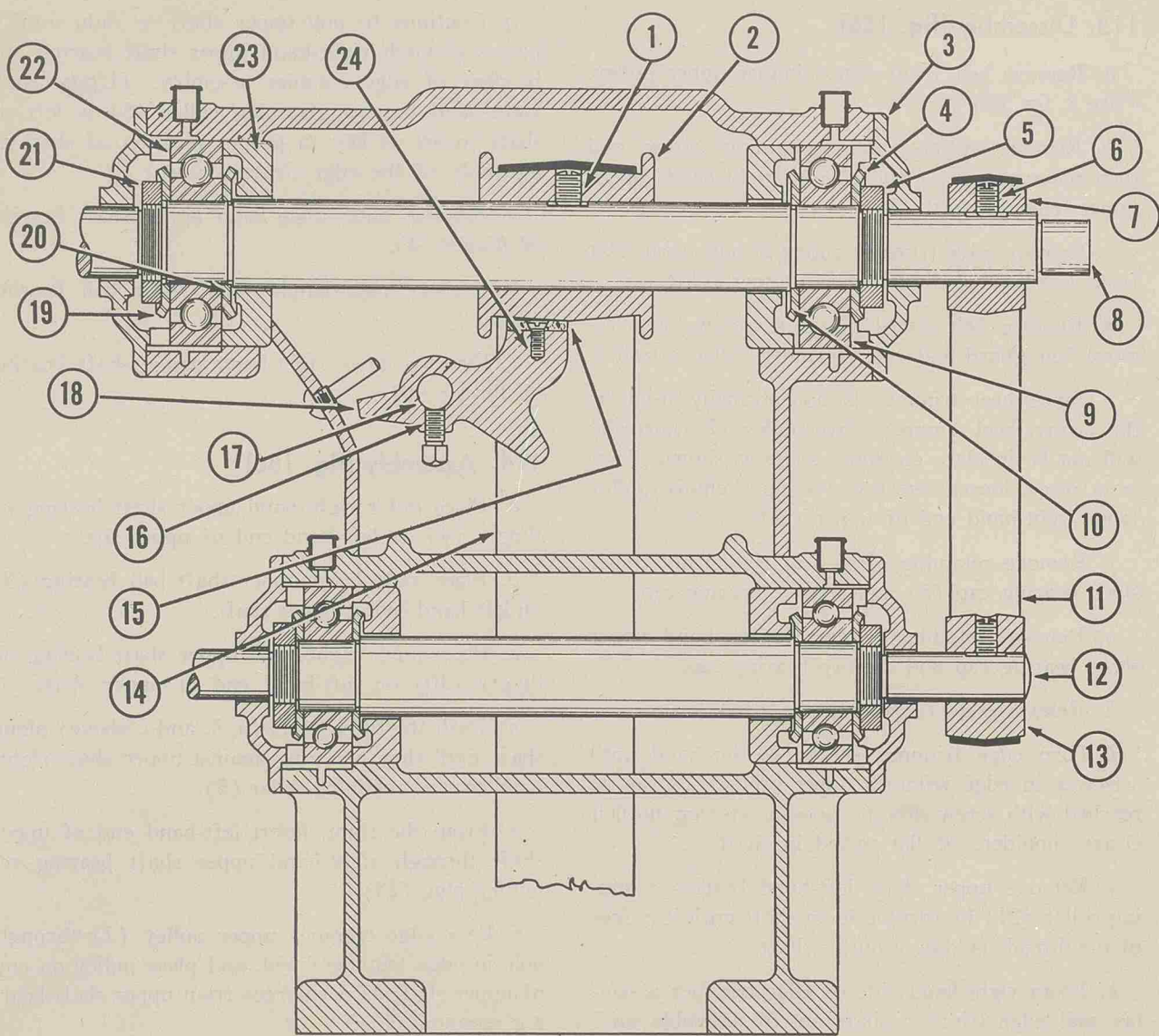
Figure 155. Clutch-operating hand lever (American).

d. CLUTCH HOUSING. The clutch housing floats on pulley when clutch is engaged. To permit free action of the housing, the connections of clutch rod (8, fig. 154) to the rod end (5) and clutch handle are not clamped tight. The screw (7) at rod end should be brought up to clamp the rod and then backed off one-half turn and locked with jam nut (6). The screw (6, fig. 155) in the clutch handle, connecting the clutch rod and handle, is tightened to compress the spring (7) about one-third its length. Lock it at that position with the jam nut. The spring checks vibration and tends to hold pulley away from cone driver when pipe clamp is properly set.

Section XIV. EDGE TRIMMER ASSEMBLY

112. Description

The edge trimmer assembly is seldom disassembled. The unit mechanic is usually concerned only with the edge trimmer cutter (par. 89) and the cutter grinder. (See pars. 115, 116, and 117.) However, it may be necessary to replace bearings on upper trimmer shaft. (See 8, fig. 156.) The partial disassembly and assembly required to perform that service are included in this section. Since the heel trimmer of the edge trimmer assembly is not used by the Army, it is not included in instructions in this section.



Ref. No.	Vendor's part No.	Vendor's nomenclature	Ref. No.	Vendor's part No.	Nomenclature
1	2-305E	Edge trimmer upper pulley set-screw.	12	2-401SA	Heel trimmer shaft.
2	2-5	Edge trimmer upper pulley.	13	2-6	Heel trimmer driven pulley.
3	2-1B1	Upper shaft bearing cap.	14	2-19	Trimmer driving belt.
4	2-601B	Outer upper shaft right-hand bearing oil flinger.	15	2-918	Brake friction stripe.
5	2-1C	Upper shaft right-hand bearing retaining collar.	16	2-318SA	Trimmer brake setscrew.
6	2-305F	Heel trimmer drive pulley set-screw.	17	2-418SA	Brake shaft.
7	2-5A	Heel trimmer drive pulley.	18	2-18	Edge trimmer brake.
8	2-401S	Upper trimmer shaft for grinding wheel.	19	2-601B	Outer upper shaft left-hand bearing oil flinger.
9	2-901E	Upper shaft ball bearing.	20	2-601B	Inner upper shaft left-hand bearing oil flinger.
10	2-601B	Inner upper shaft right-hand bearing oil flinger.	21	2-1C1	Upper shaft left-hand bearing retaining collar.
11	2-20	Heel cutter belt.	22	2-901E	Upper shaft ball bearing.
			23	2-1C2	Upper shaft bearing retaining plug.
			24	2-318SC	Trimmer brake strip screw.

Figure 156. Edge trimmer assembly.

113. Disassembly (fig. 156)

a. Remove belt from edge trimmer upper pulley. (See 2, fig. 156.)

b. Remove cutter-grinder retaining screw and then remove cutter grinder from right-hand end of upper trimmer shaft (8).

c. Remove edge trimmer cutter grinder (par. 89) from left-hand end of upper trimmer shaft.

d. Remove belt guard retaining screws and remove belt guard and cutter-grinder shield attached.

e. Since heel trimmer is not normally used by the Army, heel trimmer drive pulley (7) normally will not be in place on upper shaft as shown. If it is in place, loosen setscrew (6) and remove pulley from right-hand end of upper shaft.

f. Remove retaining screws in right-hand upper shaft bearing cap (3) and remove bearing cap.

g. Remove retaining screws in left-hand upper shaft bearing cap and remove bearing cap.

h. Release edge trimmer brake (18).

i. Turn edge trimmer shaft (8) by hand until setscrew in edge trimmer upper pulley (2) can be reached with screw driver. Loosen setscrew until it clears shoulders of flat milled in shaft.

j. Remove upper shaft left-hand bearing retaining collar (21) by turning it on shaft until it is free of the threads holding it on the shaft.

k. From right-hand side of edge trimmer assembly pull edge trimmer shaft out of assembly until left-hand end of shaft is free of left-hand shaft bearing.

l. Remove outer upper shaft left-hand bearing oil flinger (19).

m. Remove left-hand upper shaft ball bearing (22).

n. Remove inner left-hand upper shaft bearing oil flinger (20).

o. Continue to pull upper shaft to the right until left-hand end of upper shaft is about to pass through right-hand upper shaft bearing.

p. Insert hand through hole in edge trimmer hood and remove edge trimmer upper pulley (2) from end of shaft.

q. Continue to pull upper shaft to right until it passes through right-hand upper shaft bearing and is clear of edge trimmer assembly. (Upper shaft right-hand bearing retaining collar (5) is left on shaft to act as key to proper position of shaft in assembly of the edge trimmer unit.)

r. Remove outer right-hand upper shaft bearing oil flinger (4).

s. Remove right-hand upper shaft ball bearing (9).

t. Remove inner right-hand upper shaft bearing oil flinger (10).

114. Assembly (fig. 156)

a. Place outer right-hand upper shaft bearing oil flinger (4) on left-hand end of upper shaft.

b. Place right-hand upper shaft ball bearing (9) on left-hand end of upper shaft.

c. Place inner right-hand upper shaft bearing oil flinger (10) on left-hand end of upper shaft.

d. Push the three parts (*a*, *b*, and *c* above) along shaft until they are snug against upper shaft right-hand bearing retaining collar (5).

e. From the right, insert left-hand end of upper shaft through right-hand upper shaft bearing retaining plug (23).

f. Pass edge trimmer upper pulley (2) through hole in edge trimmer hood, and place pulley on end of upper shaft as it emerges from upper shaft bearing retaining plug.

g. Pass upper shaft on through edge trimmer assembly until left-hand end of shaft passes through left-hand upper shaft bearing retaining plug (23).

h. Place inner left-hand upper shaft bearing oil flinger (20) on left-hand end of upper shaft.

i. Place left-hand upper shaft ball bearing (22) on left-hand end of upper shaft.

j. Place outer left-hand upper shaft bearing oil flinger (19) on left-hand of upper shaft.

k. Place upper shaft left-hand bearing retaining collar (21) on left-hand end of upper shaft.

l. From the right, pass upper shaft on through edge trimmer assembly until upper shaft right-hand bearing retaining collar (5) holds upper shaft right-

hand bearing and oil flinger assembly in position against upper shaft right-hand bearing retaining plug (23).

m. Move edge trimmer upper pulley (2) on upper shaft until edge trimmer upper pulley setscrew (1) is in position over flat milled on shaft. Tighten setscrew.

n. Move upper shaft left-hand bearing and oil flinger assembly to the right on upper shaft until assembly contacts upper shaft left-hand bearing retaining plug (23).

o. Move upper shaft left-hand bearing retaining collar (21) right on upper shaft until collar strikes threads on upper shaft.

p. Turn retaining collar on threads until collar holds upper shaft left-hand bearing and oil flinger assembly in position against upper shaft left-hand bearing retaining plug.

q. Slide upper shaft left-hand bearing over left-hand end of upper shaft. Place bearing cap in position on bearing housing. Insert bearing cap retaining screws and tighten them securely.

r. Install edge trimmer cutter unit (par. 89) on left-hand end of upper shaft.

s. Slide upper shaft right-hand bearing cap (3) over right-hand end of upper shaft. Position bearing cap on bearing housing. Insert retaining screws and tighten them securely.

t. Place belt guard and cutter-grinder shield, attached in position, on right-hand side of edge trimmer housing. Insert retaining screws and tighten securely.

u. Install cutter-grinder (par. 89) on right-hand end of upper shaft.

v. Replace belt on edge trimmer upper pulley (2).

Section XV. CUTTER-GRINDING ASSEMBLY

115. Description

The cutter-grinding wheel operates on the end of the edge trimmer assembly upper shaft. Operation of the cutter-grinder is controlled by the edge trimmer clutch. The grinder has a universal attachment which permits setting the cutter to required position

for grinding, and an indexing adjustment which controls the uniform grinding of the cutter teeth.

116. Adjustment (fig. 157)

Tighten screw (8, fig. 157) so that cutter-grinder post (7) will not swivel on shaft (9). Release thumbscrew (11) and position cutter-grinder as shown in figure 157². Pull post (7) forward so that cutter clears outside edge of wheel about $\frac{1}{4}$ inch. Lock grinder post shaft (9) with thumbscrew (11). Adjust screw (8) so that cutter is positioned as in figure 157² as previously set, but do not permit grinding wheel to snag bottom of cutter-grinder tooth. Set grinder table (5) so that grinding wheel covers full face of tooth to be ground and lock table in position with knurled screw (16).

117. Grinder Operation (fig. 157)

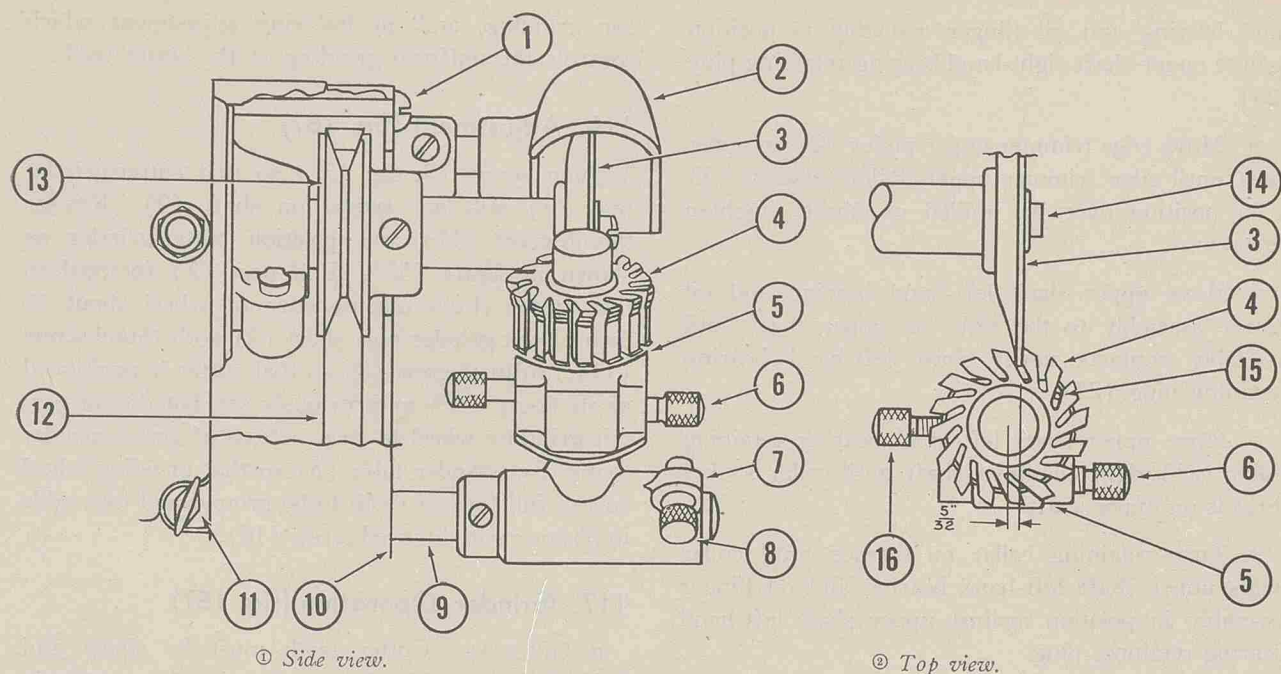
a. GENERAL. Cutter teeth must be sharp and uniformly ground if they are to trim shoes properly and quickly. Do not attempt to grind teeth down too quickly because it overheats them, and overheating lessens the temper of the cutter teeth.

b. PROCEDURE. The cutter rests on grinder table (5) and is positioned by the locating pin (15). Turn table adjusting screw (6) so that the face of the cutter tooth just touches the side of the grinding wheel. Allow sufficient clearance between cutter tooth space and locating pin (15) to permit a small turning movement of the cutter toward the grinding wheel. This movement of the cutter is necessary so that it can be moved to the grinding wheel and then held against face of wheel as cutter post is moved in and out. This permits taking light cuts and preserves the shape of the grinding wheel. When the cutter is very dull, do not attempt to sharpen it in one setting, but make a complete circuit of the cutter several times. It is unnecessary to change the position of the grinder post fulcrum shaft (9) because the adjusting screw (8) can be used to set the grinder table (5) to suit the cutter and to position the teeth for grinding so their original face angle is retained.

Section XVI. FINISHER BRUSH ASSEMBLY

118. Description

The finisher brush is treated as an assembly (fig.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	ET-12A	Belt guard retaining screw.
2		Grinder shield.
3	ET-16	Grinding wheel.
4	ET-17	Edge trimmer cutter.
5	ET-15	Grinder table.
6	ET-15B	Table adjusting screw.
7	ET-14	Grinder post.
8	ET-14F	Grinder post adjusting screw.
9	ET-14A	Grinder post fulcrum shaft.
10	ET-12	Belt guard.
11	ET-14B	Grinder belt fulcrum shaft binding thumbscrew.
12		Heel trimmer driving belt.
13		Heel trimmer driving pulley.
14	ET-16C	Grinding wheel retaining screw.
15	ET-15A	Cutter locating pin.
16	ET-15E	Grinder table binding screw.

Figure 157. Cutter-grinder assembly (American).

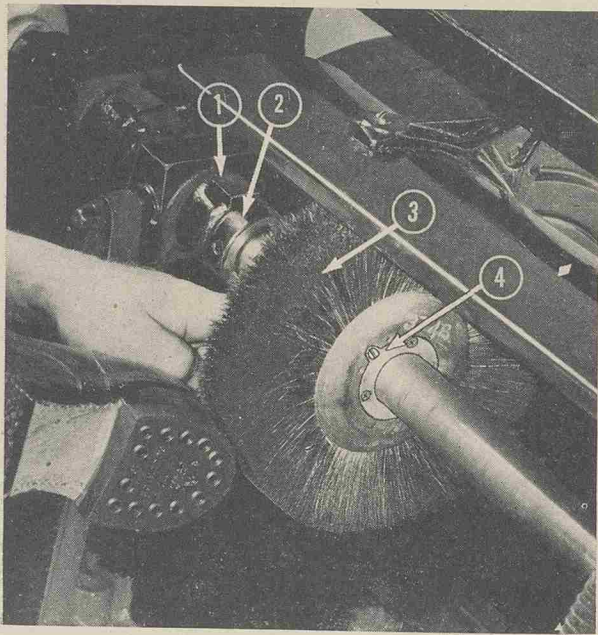
158) because the brushing surface and the wheel comprise a single unit. Thus the entire unit must be replaced when the brush is so worn or damaged that it will not perform efficiently.

119. Removal (fig. 158)

Loosen setscrew (4, fig. 158) on each side of the brush wheel until the wheel turns freely on shaft. Loosen the setscrew in the set collar (2) at each end of brush and burnisher shaft. Slide end of shaft closest to the brush out of the shaft bearing (1). Remove the set collar (2) from the end of the shaft. Remove the brush wheel from the end of the shaft.

120. Installation

Place the new brush wheel on the shaft. Replace the set collar (2, fig. 158) on the shaft. Insert the end of the shaft into the bearing. Position the shaft so that the belt between the brush and burnisher shaft and main shaft is aligned with its pulleys. Slide the set collars out to the shaft bearings and tighten the setscrews to hold the brush and burnisher shaft in correct position. Space the brush wheel on the shaft so that it divides the space between the adjacent fixtures on the shaft, and tighten the setscrews (4) in the brush wheel.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	FB-1	Shaft bearing.
2		Shaft set collar.
3	FW-64	Finishing brush wheel.
4		Finishing brush wheel setscrew.

Figure 158. Finishing brush assembly.

Section XVII. BELTS

121. Description

Good belts are essential to the efficient operation of the finishing machine. The ability of the belts to transmit power from power shaft to finishing shafts is directly related to the performance of the finishing wheels on the machine. Leather belts are standard for the finishing machine, but rubber belts may be used when humidity is so high that leather belts would stretch excessively.

122. Adjustment

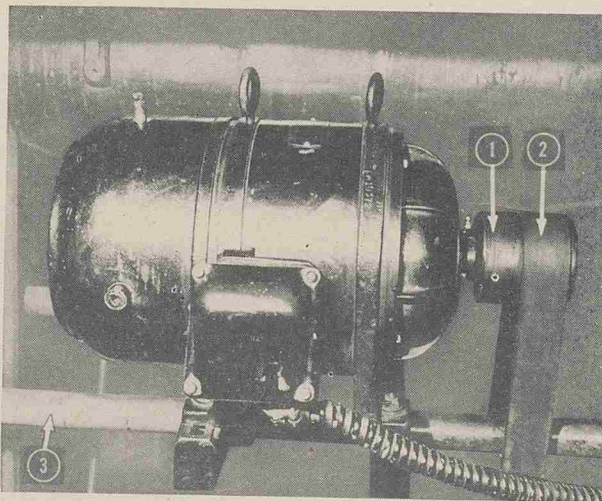
When measuring a leather belt for fitting, be sure to allow for the normal stretch which will occur in the belt after the belt has been run in. In leather belts the stretch usually amounts to $\frac{1}{8}$ inch for each foot of belt length. For example, if the actual measured distance around the pulleys to be connected is 6 feet, cut the belt $\frac{6}{8}$ inch less than 6 feet, or 5 feet 11 $\frac{2}{8}$ inches long. Ends of belt should be cut square and, when ends are fastened together, the sides of joined ends must be in line. An improperly fastened belt will creep from one

side of the pulley to the other, and the excessive wear will ruin the belt in a short time. No. 1 stag belt hooks are satisfactory fasteners for leather belts. Points of hooks should go to the pulley side of belt. Whenever leather belts stretch so much that they slip on pulleys, they must be shortened. Be sure that all belts are checked for sufficient tension before loss of motion in the finishing shafts is blamed on clutches (pars. 110 and 111) or motor.

Section XVIII. MOTOR

123. Description

A $1\frac{1}{2}$ -horsepower, single-phase, 60-cycle, 110- to 220-volt, 1,750-revolutions-per-minute motor is used on the finishing machine.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1		Motor pulley.
2	555	Motor belt.
3	FC-413	Motor rail.

Figure 159. Motor.

124. Installation

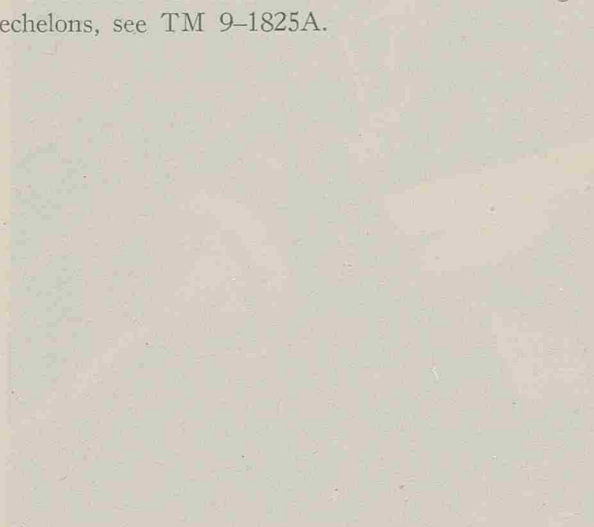
Install the motor on the frame provided on the finisher. (See fig. 129.) Make sure that motor pulley is running in the direction which will turn the top of the finishing wheels forward. The motor should be connected to a 220-volt circuit, if possible. If the motor is changed from a 110-volt to a 220-volt circuit, or changed from a 220-volt to a 110-volt circuit, be sure to change wiring connections as shown in the diagram on the inside back cover of the switch box. (See fig. 129.)

125. Maintenance

a. Keep motor housing and external parts of motor clean.

b. Lubricate motor according to instructions listed in paragraph 103.

c. For maintenance authorized third and higher echelons, see TM 9-1825A.



1. Motor housing and external parts of motor clean.	2. Lubricate motor according to instructions listed in paragraph 103.
3. For maintenance authorized third and higher echelons, see TM 9-1825A.	

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3. For maintenance authorized third and higher echelons, see TM 9-1825A.	

126. Description

The motor is a portable, self-contained unit. It is used for generating power for various equipment. The motor is mounted on a stand and has a control panel on the front. The control panel has a switch and a meter. The motor is powered by a battery or a generator. The motor is used for generating power for various equipment. The motor is mounted on a stand and has a control panel on the front. The control panel has a switch and a meter. The motor is powered by a battery or a generator. The motor is used for generating power for various equipment.

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PART FOUR

AUXILIARY EQUIPMENT

(The attachments, parts, and subassemblies on the finishing machine, as it is used by the Army, are integral parts of the machine and are not classified as auxiliary equipment.)

PART FIVE

REPAIR INSTRUCTIONS

(Because of the simplicity of the design and construction of the finishing machine, repairs made on it are performed with the tools and by mechanics

authorized to the using organization. Therefore, part five does not apply to this machine.)

BOOK 3

SOLE CUTTER AND SKIVER MACHINES

American Model C

Landis Model

PART ONE

INTRODUCTION

Section I. GENERAL

126. Scope

The instructions in book 3 apply to the sole cutter and skiver machines, American Model C and the Landis Model. These machines are used to cut and shape the leather soles of shoes.

a. Part two contains operational information for the guidance of personnel responsible for the operation of sole cutter and skiver machines.

b. Part three contains information for the guidance of personnel of using organizations responsible for the first and second echelon maintenance of sole cutter and skiver machines. It contains information needed for the scheduled lubrication and preventive maintenance services.

127. Records

a. WD AGO FORM 460 (PREVENTIVE MAINTENANCE ROSTER). The parts of this form which apply to cutter and skiver machines may be maintained to record the lubrication of this equipment, as described in paragraphs 146 and 147.

b. WD AGO FORM 468 (UNSATISFACTORY EQUIPMENT REPORT). This form will be used to report defects in the manufacturing, design, or operation of machines, assemblies, or parts. It will also be used to report complaints on the lubricants and preserving materials used in the machine. When so used, the form will contain identifying details of the products and the machinery on which they are used.

128. Orientation

Throughout this book, the terms FRONT, REAR, LEFT, and RIGHT will be used as the operator facing the front of the machine in the operating position would use them.

Section II. DESCRIPTION AND DATA

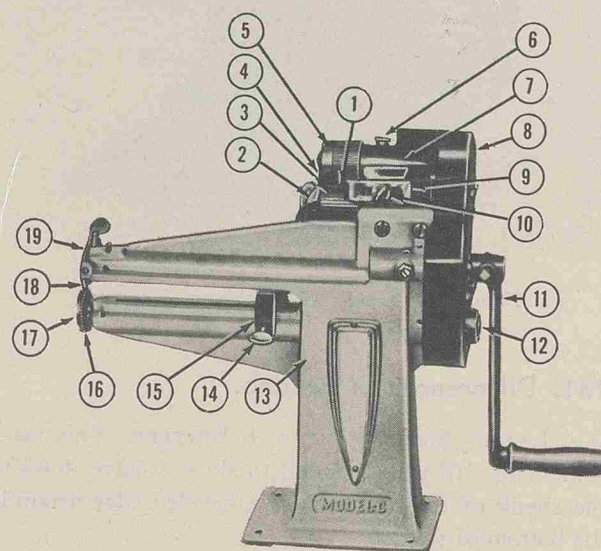
129. General

These machines are table-mounted and hand-

operated. They are simple in design and operation.

130. Identification

The name and the model number of the American machine appear on the front of the stand column of the machine. (See fig. 160.) The name of the Landis sole trimmer (fig. 162) and the name and serial number of the Landis sole skiver and beveler (fig. 161) appear on the front of the stand column of each machine.



Ref. No.	Nomenclature
1	Skiver knife.
2	Skiver bottom shaft retaining shoe.
3	Skiver bottom roll.
4	Skiver knife table.
5	Skiver top roll.
6	Skiver head oil cup.
7	Skiver head.
8	Gear guard.
9	Skiver work gauge.
10	Skiver work gauge washer screw.
11	Hand crank.
12	Sole trimmer feed wheel shaft.
13	Sole trimmer frame.
14	Sole trimmer work gauge thumbscrew.
15	Sole trimmer work gauge.
16	Sole trimmer feed wheel.
17	Sole trimmer work support roll.
18	Sole trimmer blade.
19	Sole trimmer blade guard.

Figure 160. American model C sole cutter and skiver.

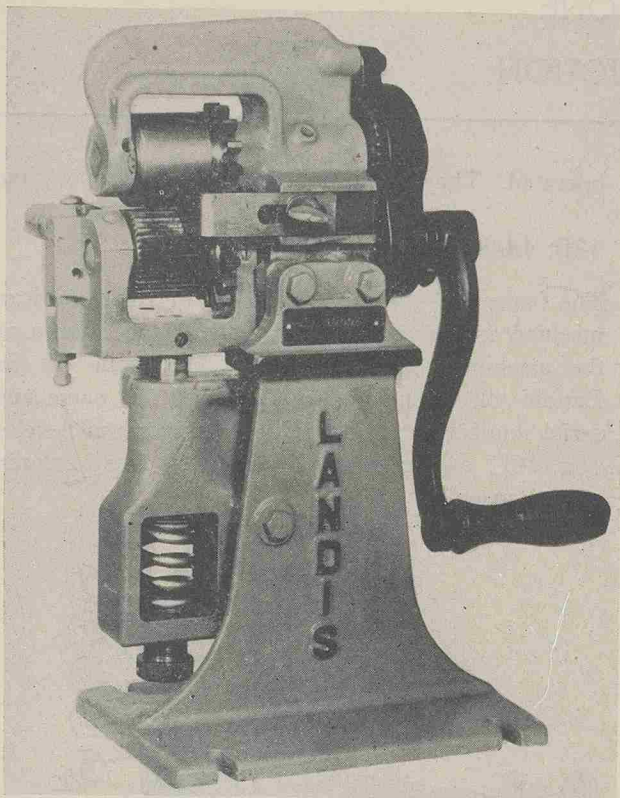


Figure 161. Landis sole skiver and beveler.

131. Differences in Models

a. LANDIS SOLE SKIVER AND BEVELER. This machine (fig. 161) is designed to skive (shave down) the shank of the sole and cut a beveled edge around the bottom of the sole.

b. LANDIS SOLE TRIMMER. This machine (fig. 162) is used to cut soles from leather strips and to trim applied soles before they are stitched.

c. AMERICAN SOLE CUTTER AND SKIVER. This cutter and skiver (fig. 160) performs the combined functions of the machines described in *a* and *b* above. It cuts, bevels and skives the sole, and trims it on the shoe before stitching. Each operation upon the sole is performed similarly, regardless of the machine used. The difference in the models is in the number or kind of operations performed by each machine.

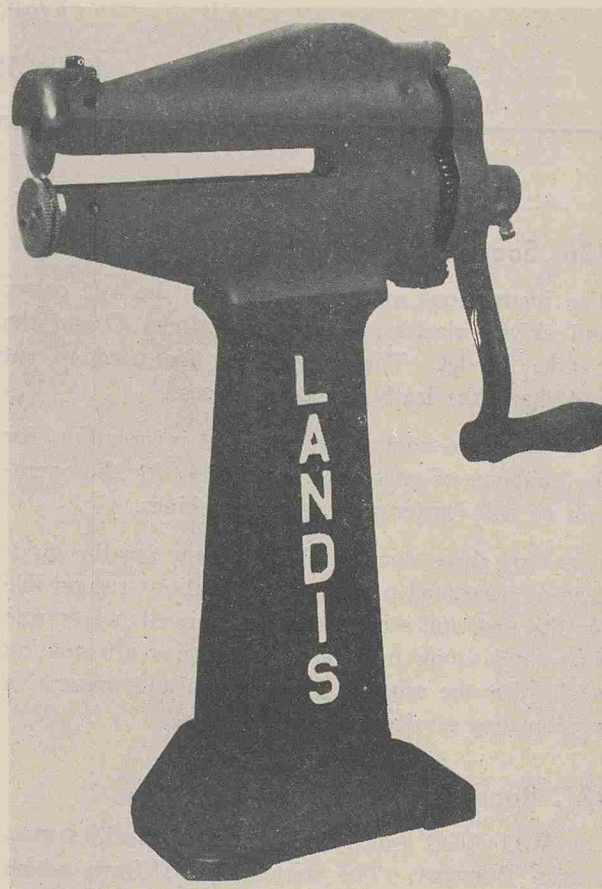


Figure 162. Landis sole trimmer.

Section III. TOOLS AND ACCESSORIES

132. Tools

These small machines are simple in construction and operate only in conjunction with more complicated shoe repair machinery equipped with tools. Only one tool is issued with the cutting and skiving machines—a single-headed wrench which is used to remove the cutting blades (16 and 18, fig. 160) from the driving shafts. The other machines in the shoe repair unit carry sufficient tools to disassemble the cutter and skiver machines completely.

133. Equipment

No equipment or supplies are issued with these machines.

PART TWO

OPERATING INSTRUCTIONS

Section IV. SERVICE UPON RECEIPT OF EQUIPMENT

134. New Equipment (fig. 160)

a. INSPECTION FOR DAMAGE IN SHIPMENT. Check to see that the skiving blade (1, fig. 160) is unbroken and is set in place on its table (4). Check condition of cutting knives. The operating crank will be shipped detached from the machine. Be sure it is included in the shipping package. Check tightness of the retaining screws and nuts.

b. REMOVAL OF CORROSION-PREVENTIVE MATERIAL. The working parts of the machine may be covered with grease, heavy oil, or some other corrosion-preventive material when the machine arrives. Remove this material with a brush or cloth soaked in cleaning solvent or Diesel fuel oil. Lubricate the machine according to instructions in paragraphs 146 and 147.

c. INSTALLATION. (1) *Assembly.* Place the hand crank (11, fig. 160) on the end of the driving shaft on the right side of the machine and turn the crank until the crank-retaining setscrew is aligned with the flat milled on the driving shaft. Tighten the setscrew securely.

(2) *Location.* In the van type shoe repair trailer, align holes in the base of the stand of the machine with matching holes in the bench on the trailer. Secure the machine with the nuts and bolts provided for installation. In the two-wheel shoe repair trailer, installation consists of removing machines from carrying clamps and placing machines in clamps on the bed of the trailer. In fixed shoe repair installations, machines will be placed on a bench high enough for them to be in a comfortable operating position. Bore holes in the surface of the bench to correspond with the holes in the base of the stand of the machine and secure with nuts and bolts. If the bench surface is wood, the machine may be secured with lag screws.

d. RUN-IN TEST. Feed a piece of leather into the cutting knives without forcing it. The cut made

by the knives should be clean and complete. Feed a piece of leather into the skiving blade. Adjust the position of the skiving blade (par. 139) until the skive is clean and the angle of the skive is satisfactory.

135. Used Equipment

Service upon receipt of used equipment is similar to service of new equipment described in paragraph 134.

Section V. CONTROLS AND INSTRUMENTS

136. Skiving-Blade Adjustment Screws

a. HORIZONTAL ADJUSTING SCREWS. The horizontal adjusting screw is located at the rear of the skiving blade. Turning the screw in forces the skiving blade forward on its table toward the feed rolls, while turning it out moves the blade to the rear away from the rolls.

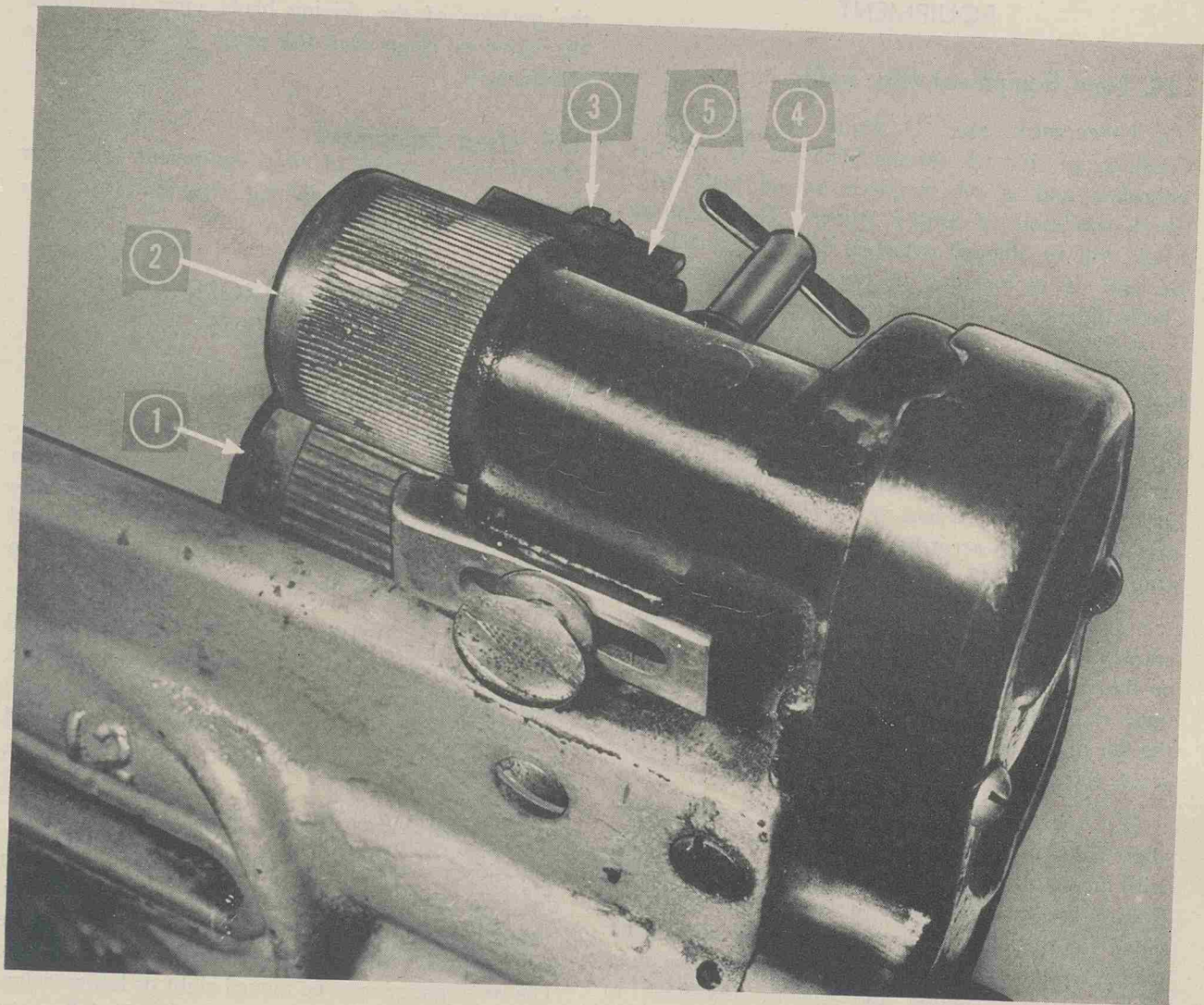
b. VERTICAL ADJUSTING SCREWS. The vertical adjusting screw is located beneath the skiving blade. Turning the screw in and up increases the length of the skive of the sole, while turning it out and down decreases the length of the skive of the sole.

137. Skiver Work Gauge (fig. 160)

The skiver work gauge (9, fig. 160), located on the face of the skiver head (7), guides the sole through the rolls of the skiver. The work gauge is secured to the skiver head with a thumbscrew (10). The work gauge may be moved right or left to determine the width of the skive or the level of the sole. Moving the work gauge to the left makes the skive narrower while moving it to the right makes it wider.

138. Sole Cutter Work Gauge (fig. 160)

The sole cutter work gauge (15, fig. 160), located between the upper and lower cutter arms of the sole cutter frame (13), is secured to the lower trimmer arm by a thumbscrew (14). The work



Ref. No.	Nomenclature
1	Bottom skiver roll.
2	Top skiver roll.
3	Horizontal adjusting screw.
4	T-handle binding screw.
5	Skiver blade.

Figure 163. Skiver adjustment.

gauge determines the width of the piece to be cut from leather by the cutter blades. Moving the cutter work gauge to the right increases the width of the cut which can be made, while moving it to the left decreases the width of the cut.

Section VI. OPERATION UNDER USUAL CONDITIONS

139. Skiving

a. SETTING FEED ROLLS. The top and bottom feed rolls (5 and 3, fig. 160) should be set $\frac{3}{32}$ inch apart. They are adjusted to that position by moving the adjusting cap screw going through the fork at the rear of the machine.

b. SETTING SKIVING KNIFE. Adjust the horizontal adjusting screw (3, fig. 163) at the rear of the skiving knife to bring the cutting edge of the knife about $\frac{1}{64}$ inch short of the forward stop. The inside cutting edge of the knife should clear the skiver top roll (2) about $\frac{1}{32}$ inch. The outside cutting edge of the knife should clear the skiver bottom roll (1) a scant $\frac{1}{32}$ inch. This adjustment sets the skiving knife at a slight angle to the rolls. To adjust the angle position of the inside edge of the skiving knife, loosen the T-handle binding screw (4) and turn the eccentric bushing to the proper position. Tighten the cap screw. When the skiving knife (5) has been positioned, tighten the knife-retaining screws.

c. OPERATION. Turn the hand crank (11, fig. 160) evenly. Feed leather against the skiver work gauge (9, fig. 160) and between the feeding rolls. Do not force leather against the knife. If the feed rolls and the knife are set properly, the leather will be drawn into the knife smoothly and without jamming. Adjust the position of the skiving knife (*b* above) until the angle and the length of the skive are satisfactory.

140. Cutting and Trimming

a. ADJUSTING SOLE CUTTER WORK GAUGE. Loosen work gauge thumbscrew. (See 14, fig. 160.) Slide the work gauge (15, fig. 160) on the lower arm until the distance between the work gauge and the sole cutter blade (18, fig. 160) equals the width of the cut which is to be made in the leather. Secure the work gauge thumbscrew.

b. CUTTING. Turn hand crank, place the edge of

the leather flat against the work gauge, and start the end of the leather between the cutter blade and the cutter feed wheel. (See 16, fig. 160.)

c. TRIMMING. Turn hand crank and guide the sole of the shoe upon the sole cutter work support roll. (See 17, fig. 160.) Trim the sole to the margin desired.

Section VII. OPERATION UNDER UNUSUAL CONDITIONS

141. General

The simple design and the slow operating speed of cutter and skiver machines make them relatively unaffected by most unusual operating conditions which could be tolerated by the operator. However, some precautions should be taken to protect machines from dust and dirt when necessary.

142. Operation in Extremely Dusty or Dirty Conditions

Operating a dirty machine damages it. Remove sand and grit before placing shoes or leather in the cutter and skiver machines. Clean feed rolls, trimming wheels, and exposed gear surfaces daily when operating under extremely dusty or dirty conditions.

Section VIII. DEMOLITION TO PREVENT ENEMY USE

143. General

In a theater of war, where lines are fluid and the tactical situation may change rapidly, it may be necessary to dispose of this equipment quickly so that the enemy may not use it.

144. Procedures

a. REMOVAL. If possible, move the machines in the shoe trailer to some safe location outside the threatened area.

b. DISPOSAL. If removal is not possible, demolish the machines so thoroughly that nothing in them is useful to the enemy. Use the ax or mattock in the trailer to smash the frame, feed rolls, trimming wheels, driving shafts, driving gears, and the crank of the machine.

PART THREE

MAINTENANCE INSTRUCTIONS

Section IX. SPECIAL ORGANIZATION TOOLS AND EQUIPMENT

145. General

No special organization tools and equipment for sole cutter and skiver machines are issued. Because of their simple design, they may be serviced adequately with tools issued with the other repair machinery used in conjunction with them.

Section X. LUBRICATION

146. Lubrication Chart

a. The lubrication chart presented in figure 164 prescribes first and second echelon lubrication maintenance.

b. The service intervals specified in the lubrication chart are for normal operating conditions. Under extreme conditions, such as excessively high or low temperatures, continued operation in sand or dust, immersion in water, or exposure to moisture, these intervals should be reduced. Failure to reduce them may result in malfunctioning or damage to the machines.

c. The lubricants prescribed in the KEY for use on this machine are to be used at all temperatures.

147. Detailed Lubrication Instructions

a. LUBRICATION EQUIPMENT. Each sole cutter and skiver machine is supplied with lubrication equipment adequate to maintain it. Make certain that the lubrication equipment is cleaned both before and after use. Operate the equipment carefully and in such manner as to insure a proper distribution of the lubricant.

b. POINTS OF APPLICATION. Oilholes are readily located by reference to the lubrication chart, which is supplemented by individual photographs of the points of lubrication. (See figs. 165 through 168.) Wipe all points and surrounding surfaces clean before applying the lubricant.

c. CLEANING. Use dry-cleaning solvent or Diesel fuel oil to clean or wash all parts. The use of gasoline for this purpose is prohibited. After washing, dry all parts thoroughly before applying lubricant.

d. LUBRICATION NOTES ON INDIVIDUAL UNITS AND PARTS. Every week lubricate the following moving parts with one or two drops of engine oil:

- (1) Feed roll shaft.
- (2) Feed knife shaft.
- (3) Cutter shaft.
- (4) Gears.

Section XI. Preventive Maintenance

148. General

Preventive maintenance services are performed by the maintenance personnel of the using organization. These services generally consist of before-, during-, and after-operation services performed by the operator; and the scheduled services (weekly and monthly) performed by organizational maintenance personnel.

149. Operator Maintenance (First Echelon)

a. BEFORE-OPERATION SERVICE. (1) *General*. This inspection schedule is designed primarily as a check to see that the cutter and skiver machines have not been damaged or tampered with since last after-operation service was performed.

(2) *Procedures*. (a) *Lubrication*. Lubricate according to instructions described in paragraphs 146 and 147.

(b) *Skiver*. Turn hand crank and observe the motion of feed rolls. They should turn easily. See that they are spaced $3/32$ inch apart, as they were set. Check position of the skiver knife to see that it is set properly for the type of work to be done.

(c) *Cutter*. Turn hand crank and check action of the cutter blade and the cutter feed wheel. They should be firmly attached to the driving shafts, and the shafts should turn freely.

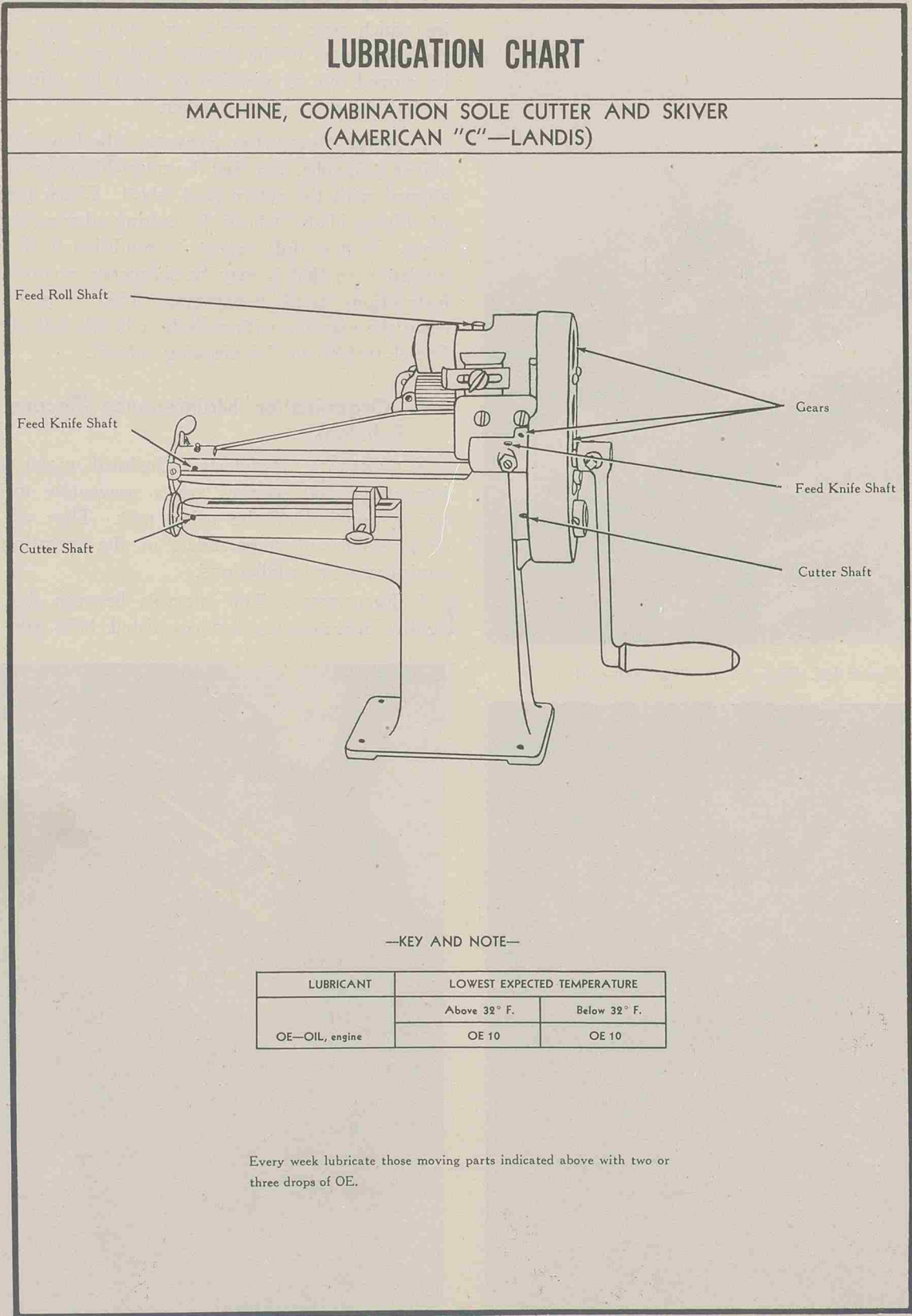


Figure 164. Lubrication chart.

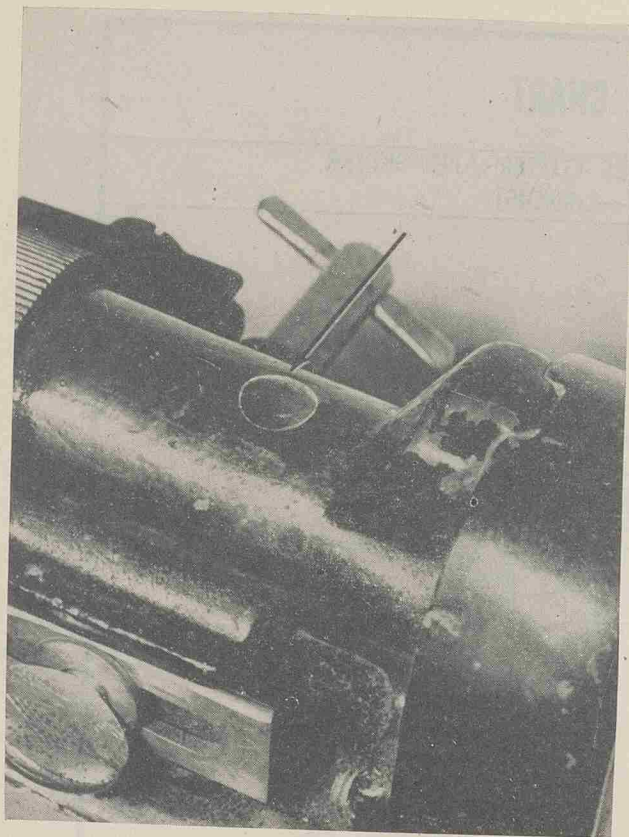


Figure 165. Feed roll shaft bearing—top.

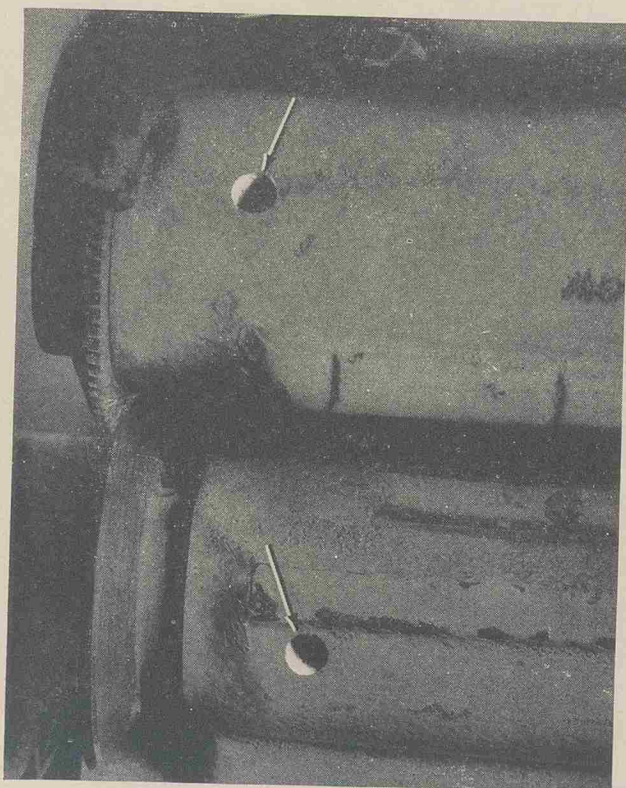


Figure 166. Feed roll and cutter shaft bearings—left side.

b. DURING-OPERATION SERVICE. The only service which must be performed during operation is the adjustment of the skiving blade in case it should be moved out of position or must be adjusted to change the skive of the leather.

c. AFTER-OPERATION SERVICE. Check position of skiver feed rolls. See that the cutter blade is properly aligned with the cutter feed wheel. Check position of skiving blade. Check the cutting edge of skiving blade. If it is dull, report its condition to the unit mechanic so that it may be sharpened according to instructions listed in paragraph 156. If necessary, clean the machine with a cloth or brush soaked with Diesel fuel oil or dry-cleaning solvent.

150. Organization Maintenance (Second Echelon)

a. GENERAL. Regularly scheduled maintenance inspections and services are a preventive maintenance function of the using unit. They are the responsibility of commanders of the operating organizations or installations.

b. FREQUENCY. The intervals between the preventive maintenance services listed here are con-

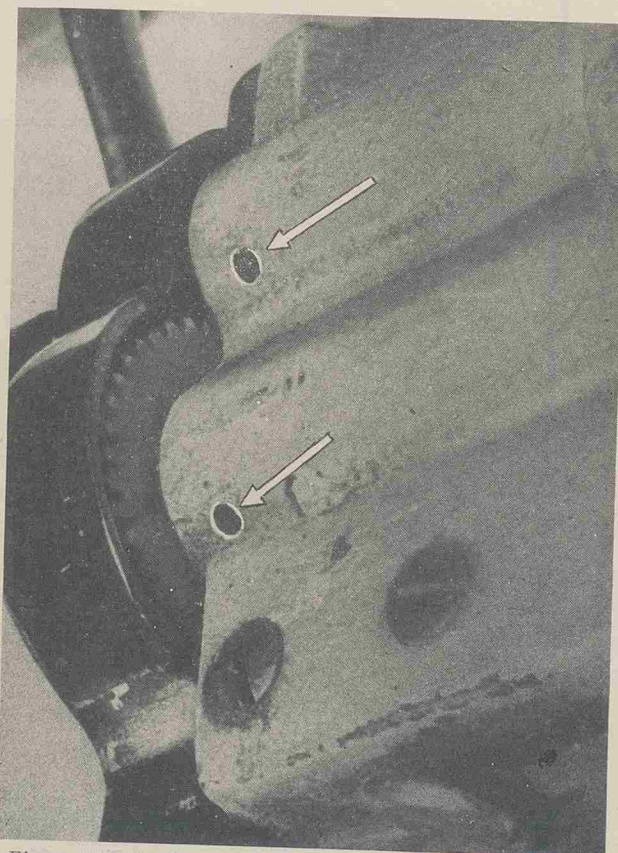


Figure 167. Feed roll and cutter shaft bearings—right side.

sidered a minimum requirement for the normal operation of the machine.

c. FIRST ECHELON PARTICIPATION. The operator should assist the unit mechanic while second echelon maintenance services are performed on his machine.

d. PROCEDURES. (1) *Weekly*. The following maintenance services will be performed weekly:

(a) *Screws and nuts*. Check tightness of all screws and nuts on the machine. If adjusting screws are loose, make sure that they are properly positioned when tightened.

(b) *Skiver*. Turn hand crank and run piece of scrap leather through skiver. Check feeding action of feed rolls. Check condition of cutting edge of skiver blade. If dull, remove blade, sharpen it (par. 156), and replace blade in position.

(c) *Sole cutter*. See that cutter blade and feed wheel are firmly secured to driving shafts. The cutter blade should be positioned between the cutter feed wheel and the cutter work roll. Turn hand crank and feed a piece of leather into the cutting

wheels. The cut should be distinct and the leather should part without feathering.

(2) *Monthly*. No monthly service is prescribed.

Section XII. TROUBLE SHOOTING

151. General

This section contains trouble-shooting information which can be helpful in determining the causes of trouble that may develop in the cutter and skiver machines.

152. Skiving Difficulties

The principal symptoms of trouble are failure to feed and uneven skiving. Paragraph 153 lists the causes for failure to feed and their remedies. Paragraph 154 lists the causes for uneven skiving and their remedies.

153. Causes and Remedies for Failure to Feed

Possible cause	Remedy
Improper position of feed wheels.	See that feed rolls are securely attached to feed roll drive shafts. Feed rolls should be set 3/32 inch apart. Adjust to that position with adjusting cap screw passing through fork in rear of machine.
Skiver blade set too far forward, jamming leather between feed rolls.	Adjust screw at rear of blade to bring cutting edge of blade forward to within 1/64 inch of forward stop. As blade becomes shorter from sharpening, position of adjusting screw must be changed to bring blade farther forward.

154. Causes and Remedies for Uneven Skiving

Possible cause	Remedy
Dull skiver blade.....	Remove skiver blade and sharpen it. (See par 156.)
Skiver blade set at improper angle to rolls.	Inside cutting edge of blade should clear the top feed roll about 1/32 inch. Outside cutting edge should clear the bottom feed roll a scant 1/32 inch.
Unevenly sharpened skiver blade.	Remove blade and sharpen correctly. (See par. 156.)

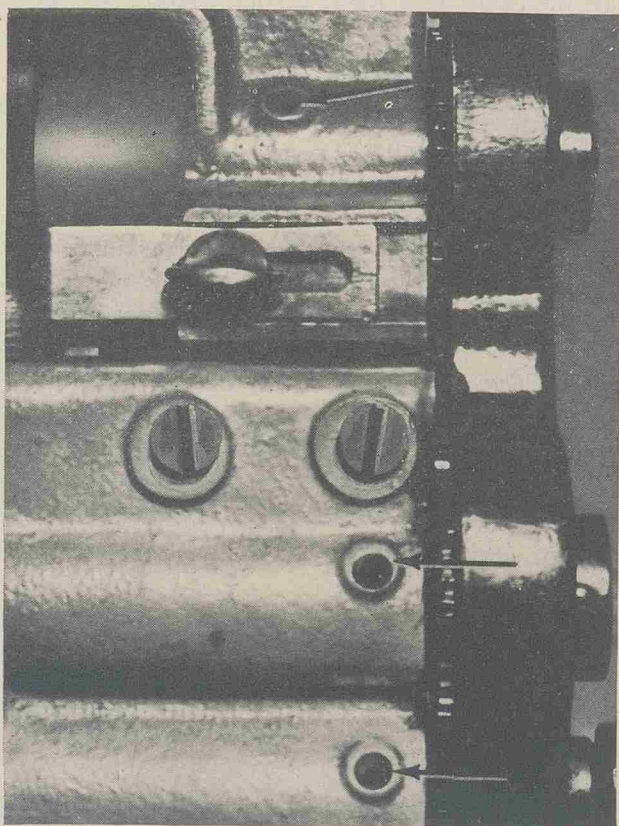


Figure 168. Driving gears.

Section XIII. SECOND ECHELON MAINTENANCE

155. General

This section is devoted to the maintenance of cutter and skiver machines which second echelon maintenance units are authorized to perform. The maintenance unit of the using organization may completely disassemble these simple machines. In actual practice, however, complete disassembly of these machines is seldom necessary.

156. Sharpening Skiver Blade

The skiver blade should be stoned on both sides so that the finished cutting edge is in the center of the thickness of the blade. Sharpen the blade on a stone either of a fine grade or of a combination of medium and fine grade. If the blade must be ground down a great deal, initial grinding should be done on a stone of medium grade. Hold the blade slightly in excess of the angle of the existing bevel ground on the stone. Stone first one side, then the other, maintaining proper stoning angle, until the blade has been stoned to a keen slightly "feather" edge. The feather edge may be removed by stoning the blade in a circular motion on a stone of fine grade, or by stropping the blade on leather or wood. The sharpened edge of the skiver blade should be straight and uniformly beveled.

157. Replacement of Skiver Feed Rolls (fig. 160)

a. REMOVAL. Remove skiver top roll retaining screw. Remove skiver top roll (5, fig. 160) from the driving shaft. Remove skiver bottom shaft retaining shoe. Loosen retaining screw in skiver bottom roll. (See 3, fig. 160.) Remove skiver

bottom roll from driving shaft.

b. INSTALLATION. Place skiver bottom roll (3) on bottom roll driving shaft. Secure retaining screw in skiver bottom roll. Install skiver bottom shaft retaining shoe. Place skiver top roll (5) on top roll driving shaft. Secure skiver top roll retaining screw.

158. Replacement of Cutter Blade and Feed Wheel (fig. 160)

a. REMOVAL. Remove retaining screws securing sole cutter work support roll (17, fig. 160) to sole cutter feed wheel (16). Remove cutter work support roll. Remove sole cutter blade guard retaining screw. Remove sole cutter blade guard (19). Place shank wrench on shank of cutter blade between blade and upper cutter arm. Turn top of trimmer blade forward until trimmer is turned off the cutter blade driving shaft. Place shank wrench on shank of sole cutter feed wheel (16) between the cutter feed wheel and the lower cutter arm. Turn the top of the cutter feed wheel to the rear until it is turned off the cutter feed wheel driving shaft.

b. INSTALLATION. Place cutter feed wheel (16) on end of cutter feed wheel driving shaft. Use the shank wrench to turn the top of the cutter feed wheel forward until it is secure on the driving shaft. Place the cutter blade (18) on the end of the cutter blade driving shaft. Use the shank wrench to turn the top of the cutter blade to the rear until it is secure on the driving shaft. Put the sole cutter blade guard (19) in place over the sole cutter blade. Secure the blade guard to the upper cutter arm with the blade guard retaining screw. Place the sole cutter work support roll (17) on the sole cutter feed wheel, and secure the work support roll to the feed wheel with work support roll retaining screws.

PART FOUR

AUXILIARY EQUIPMENT

(Cutter and skiver machines for military use contain no attachments or parts which are not integral parts of the machine. Therefore they have no equip-

ment which may be classified as auxiliary equipment.)

PART FIVE

REPAIR INSTRUCTIONS

(Because of the simplicity of their design, cutter and skiver machines are repaired with the tools and by the mechanics of the using organization. Repair

of the components of the cutter and skiver machines is therefore covered in part three.)

BOOK 4
PATCHING MACHINE

Singer Models

29K58, 29K60, 29K62, 29K70

PART ONE

INTRODUCTION

Section I. GENERAL

159. Scope

The instructions in book 4 apply to the Patching Machine, Singer Models 29K58, 29K60, 29K62, and 29K70. The text of this book is based on one standard model, Model 29K70, and the other three models are referred to only as they differ from Model 29K70. The patching machine is a foot-powered sewing machine which is used to make stitching repairs on the leather uppers of shoes.

a. Part two contains information on the operation of the patching machine, and describes and locates its controls. Unless otherwise specified, these instructions apply to the Singer Model 29K70 Patching Machine. When the instructions differ for any of the other three models, they will be specifically referred to.

b. Part three contains information for the guidance of personnel of using organizations responsible for the first and second echelon maintenance of the patching machine. It contains information needed for the performance of the scheduled lubrication and preventive maintenance services, as well as for adjustments on assemblies which using organizations are equipped to perform.

c. Part five contains instructions for the information and guidance of personnel responsible for third and higher echelon maintenance of the patching machine. It includes the one major assembly of the patching machine which should not be disassembled by the unit mechanic of the using organization.

160. Requisitioning Information

a. IDENTIFICATION. Parts and supplies should be requisitioned by Federal stock number and standard nomenclature when this information is available. Otherwise order parts and supplies by the model number of the machine to be maintained and the manufacturer's (vendor's) part number. The manufacturer's part number is usually stamped on each part. The model number of the machine is stamped

upon the brass plate attached to the arm of the machine head. Do not confuse the model number of the machine with the serial number, which is stamped into the iron casting of the bed of the machine. Include the vendor's code (SIN) in the nomenclature for each part.

b. NEEDLES. A requisition for needles should include the number of needles desired, the size, class number, and variety number. In this sample requisition, "200 size 16, 29 by 4 needles," 200 is the number of needles required; 16 is the size; 29 is the class number; and 4 is the variety number.

161. Records

a. WD AGO FORM 460 (PREVENTIVE MAINTENANCE ROSTER). The parts of this form which apply to the patching machine may be maintained as a record of the maintenance of this equipment.

b. WD AGO FORM 468 (UNSATISFACTORY EQUIPMENT REPORT). This form will be used to report defects in the manufacture, design, or operation of machines, assemblies, or parts. It will also be used to report complaints concerning the lubricants and preserving materials. In the latter case, the form will contain details identifying both the products and the machinery on which they are used.

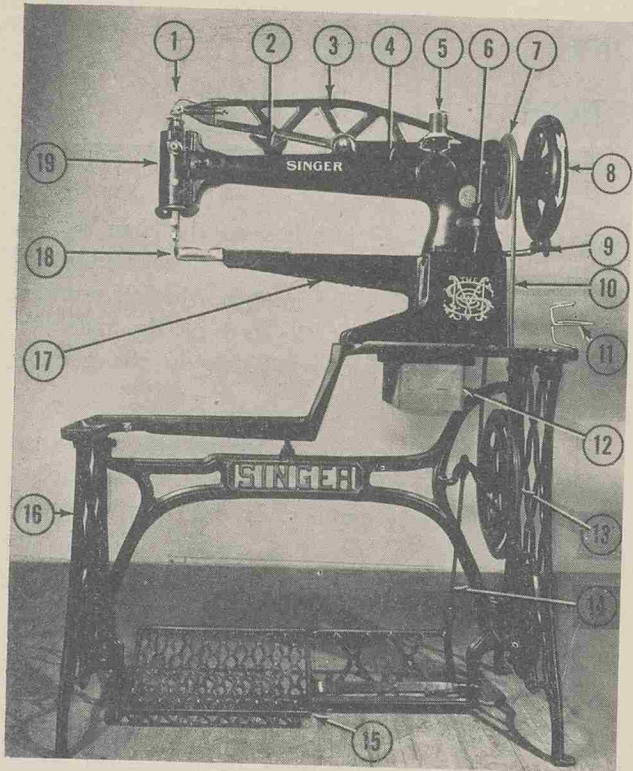
162. Orientation

Throughout book 4, the terms FRONT, REAR, LEFT, and RIGHT will apply as the operator sitting at his machine in the operating position would use them. Figure 169 shows the front of the machine.

Section II. DESCRIPTION AND DATA

163. Description

a. GENERAL. Each machine consists of three basic parts: the machine head, the sewing stand, and the footpower assembly which is contained in the stand. The machine head is a compact unit which controls the action of the thread, needle, and shuttle to lock



Ref. No.	Nomenclature
1	Check lever (take-up lever).
2	Oil cup.
3	Needle bar driving lever.
4	Arm.
5	Thread spool.
6	Model plate.
7	Shaft pulley.
8	Balance wheel.
9	Bobbin winder.
10	Belt.
11	Bobbin winding thread guide.
12	Tool drawer.
13	Band wheel.
14	Pitman.
15	Treadle.
16	Stand.
17	Bed.
18	Shuttle-driving gear box (rack box).
19	Head of arm (face).

Figure 169. Singer 29K patching machine (model 29K62).

a firm continuous stitch in the leather of the shoe. The sewing stand is a frame which supports the machine head and the accessories of the machine necessary to the sewing operation. The footpower assembly comprises the foot treadle, the foot treadle crank, and the power driving pulley. A round leather belt connects the power driving pulley with a pulley

on the driving shaft in the arm of the machine head. Thus the motion of the operator's feet on the foot treadle cranks the power driving pulley, rotating the driving shaft of the machine head. The driving shaft, directly or indirectly, motivates all the moving parts of the machine head.

b. DIFFERENCES IN MODELS. All four of the patching machines in the Singer 29K class—models 29K58, 29K60, 29K62, and 29K70—are basically the same in appearance, operation, and maintenance. The machines differ in the following respects:

(1) *Dimensions of parts.* The machines vary in length of arm and in dimensions at the end of the shuttle-driving gear box. These differences will be noted in the tabulated data. (See par. 164.)

(2) *Minor variations in operation procedures.* These differences are noted in paragraphs 172 through 197.

(3) *Differences in parts.* Some machine parts are interchangeable among the different models. However, unless complete parts lists for all models are available to the using unit so that similar parts can be carefully checked, parts should be requisitioned for the specific model to be repaired.

164. Tabulated Data

- a. MODEL 29K58. (1) Universal upper feed.
 (2) Oscillating horizontal shuttle.
 (3) Stop motion balance wheel.
 (4) Replaceable steel horn.
 (5) Hand feeding foot lift.
 (6) Eccentric adjustment for shuttle timing.
 (7) Check lever thread take-up adjustment with indicator.
 (8) Graduated feed motion bell crank to indicate length of stitch.
 (9) Width at end of shuttle-driving gear box: 1 inch.
 (10) Depth at end of shuttle-driving gear box: $\frac{7}{8}$ inch.
 (11) Distance from needle to base of arm: $12\frac{1}{4}$ inches.
 (12) Diameter of belt grooves: 3 inches and 5 inches.
 (13) Two-speed drive.

b. MODEL 29K60. Tabulated data for this model are the same as for model 29K58, with the following exceptions:

- (1) Width at end of shuttle-driving gear box:

1-5/32 inches.

(2) Depth at end of shuttle-driving gear box:
1-1/16 inches.

(3) Diameter of belt grooves: 3 1/4 inches and
5 1/2 inches.

(4) Large shuttle (for waxed thread).

(5) Distance from needle to base of arm: 17 1/2
inches.

c. MODEL 29K62. Tabulated data for this model
are the same as for model 29K58, with the follow-
ing exceptions:

(1) Diameter of belt grooves: 3 1/4 inches and
5 1/2 inches.

(2) Waxed thread may be used.

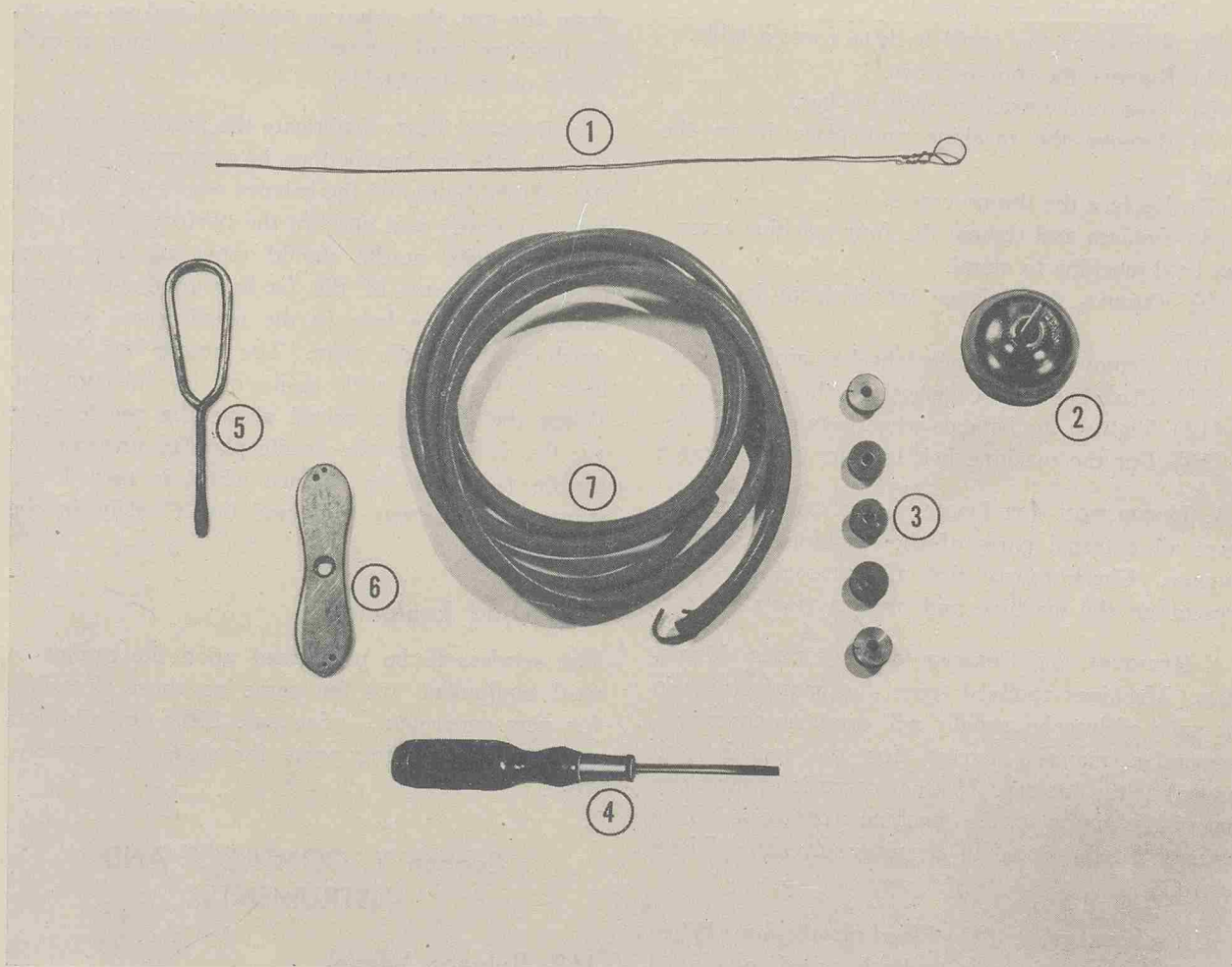
(3) Distance from needle to base of arm: 17 1/2
inches.

Note. Comparison of *b* and *c* above will show that models
29K60 and 29K62 differ only in the dimensions at the end
of the shuttle-driving gear box.

Section III. TOOLS AND ACCESSORIES

165. Tools and Supplies

The tools and supplies issued with the machine for
use in first echelon (operator) maintenance are
shown in figure 170.



Ref. No.	Nomenclature
1	Needle bar threading wire.
2	Oiler.
3	Shuttle bobbins.
4	Screw driver.
5	Screw driver.
6	Needle plate.
7	Belting.

Figure 170. Tools and supplies.

PART TWO

OPERATING INSTRUCTIONS

Section IV. SERVICE UPON RECEIPT OF EQUIPMENT

166. New Equipment

a. UNBOXING. (1) Remove the panel connecting screws.

- (2) Remove the front panel.
- (3) Swing the top panel back to form a table.
- (4) Remove the thumbscrews.
- (5) Remove the machine securing bar.
- (6) Remove the machine and place it on the stand.
- (7) Replace the thumbscrews.
- (8) Replace and tighten the four machine screws that hold machine to stand.
- (9) Remove the balance wheel from inside of the box.
- (10) Remove the balance wheel retaining screw.
- (11) Place the balance wheel on the arm shaft.
- (12) Tighten the balance wheel retaining screw.
- (13) Put the machine belt in place on the stand.

b. INSPECTION FOR DAMAGE IN SHIPMENT. Inspect all external parts of the machine for visible damage. Check to see that all external parts are present on the machine and properly installed.

c. REMOVAL OF CORROSION-PREVENTIVE MATERIAL. Machines received from the manufacturer in the zone of interior usually will carry no corrosion-preventive material except for the machine oil applied at the factory. If other corrosion-preventive material is found on the machine, remove it with a cloth or brush soaked in cleaning solvent or Diesel fuel oil.

d. INSTALLATION. (1) *Fixed installations.* When the patching machine is to be installed in a fixed repair installation, the machine head and the machine stand are set in place as a single unit. Place the stand on a level area of the floor. Fasten each leg of the stand to the floor with a lagscrew.

(2) *Shoe repair semitrailers.* The machine head and the machine stand are installed as a unit. Each leg of the machine stand is fastened to the floor of

the trailer with a roundheaded screw and nut.

(3) *Two-wheel shoe repair trailers.* On the two-wheel shoe repair trailer (book 5) the machine head and the stand are carried separately. The machine head is carried in a compartment on the bed of the trailer and the stand is carried (folded) on the stitcher-finisher unit. To prepare the patching machine for use, the stand is unfolded and set up and the machine head secured to it with a clamp at each corner of the stand table.

e. RUN-IN TEST. Lubricate the patching machine according to the instructions in paragraphs 204 and 205. Turn the top of the balance wheel (8, fig. 169) forward slowly and observe the performance of the machine. The needle should move up and down between the arms of the feeding foot and should pass through the hole in the needle plate without touching the needle plate. The needle bar driving lever (3) should rock easily on its fulcrum pin. When the needle is raised above the needle plate (2, fig. 175), turn the needle plate to uncover the shuttle (4). As the balance wheel is turned, the shuttle should turn back and forth easily in the shuttle race.

167. Used Equipment

The services to be performed upon the receipt of used equipment are the same as those described for new equipment. (See par. 166.) In addition, check visible moving parts for signs of excessive wear.

Section V. CONTROLS AND INSTRUMENTS

168. Balance Wheel

The balance wheel (8, fig. 169) has two functions. As it turns with the shaft, the weight of the wheel lends momentum to the shaft, making the motion of the machine more even. The operator uses the balance wheel in starting the machine and in running the machine slowly by hand. To start the machine, turn the top of the balance wheel forward,

so that the action of the treadle will smoothly increase the speed of the machine.

169. Revolving Wings

The head revolving bush handle, commonly known as the revolving wing (3, fig. 172), is used in making a curved line of stitching. To make a curved line of stitching, operate the machine slowly and, without turning the work, turn the revolving wings sufficiently to produce the desired curve.

170. Stitch Regulator

The stitch regulator (3, fig. 187) regulates the length of the stitch. A thumbscrew holds it in position at the rear of the feeding foot bar. Length of stitch is adjusted by setting the stitch regulator at the desired position on the feeding foot bar.

171. Lifter

The lifter (3, fig. 188) is a hand lever which is moved up or down to raise or lower the feeding foot. (See 7, fig. 172.)

Section VI. OPERATION UNDER USUAL CONDITIONS

172. Preliminary Instructions

a. The top of the balance wheel should always be turned toward the operator. If the balance wheel is fitted at the front of the machine, always turn it from left to right (clockwise).

b. Always raise the feeding foot when the machine is not sewing.

c. Do not operate the machine when the shuttle and needle are threaded, unless there is some working material under the feeding foot.

d. Do not pull the material when the machine is operating. The needle may be deflected enough to strike the needle plate and break.

173. Speed of Machine

The speed of the machine should be regulated to suit the kind of work which is being done. For thick work, put the belt on the larger pulley of the machine head and on the smaller pulley of the band wheel. The mechanical advantage of this pulley arrangement gives the needle increased penetrating

power. For light work, put the belt on the smaller pulley of the machine head and on the larger pulley of the band wheel.

174. Starting Machine

Raise the feeding foot (7, fig. 172) by means of the lifter (3, fig. 188) and place both feet upon the treadle. To start the machine, turn the top of the balance wheel (8, fig. 169) forward. Move the feet freely with the motion of the treadle, until the machine has settled into a regular and easy movement. When the machine is running freely, the operator should be able to remove his feet from the treadle, replace them on the treadle, and restore the motion of the machine without allowing the balance wheel to turn in the wrong direction (top to rear).

175. Feeding Work

When familiar with the working movement of the machine, place a piece of cloth or leather under the feeding foot. (See 7, fig. 172.) Lower the feeding foot on the material by lowering the lifter. (See 3, fig. 188.) Then operate the machine until accustomed to guiding the material under the feeding foot.

176. Changing Direction of Stitch

The material is moved along by the feeding foot only. The direction of the stitch can be changed, as desired, by turning the revolving wings. (See 3, fig. 172.) To make a curved line of stitching, operate the machine slowly and, without turning the work, turn the revolving wings sufficiently to produce the desired curve. To turn a corner with the stitch, stop the machine and turn the top of the balance wheel forward until the feeding foot rises from the material. Then turn the work as desired, using the needle as a pivot. The feeding foot rises after each stitch while the needle is in the material. Thus the needle may serve as a pivot upon which the material can be turned in any direction. The feeding foot may be adjusted to work in a straight line in any direction, by tightening the knurled setscrew (19, fig. 204) on the front of the head of the machine. Never turn the work or alter the direction of the feed while the foot is pressing on the material. These practices may cause stitches to be missed and may damage the surface of the work.

177. Needle Plate Selection

Two double end needle plates are furnished with the machine. Each needle plate is marked with the sizes of needles (fig. 171) which it will accommodate. See that the proper needle plate for the needle to be used is applied to the machine and placed in the correct position.

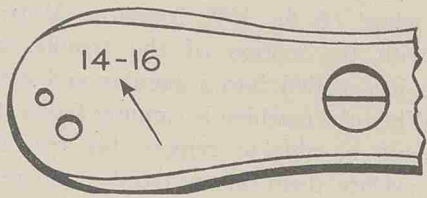


Figure 171. Needle sizes stamped on needle plate.

178. Needle Selection

The size of the needle to be used is determined by the size and type of the thread and the weight of the leather to be worked. The thread must pass freely through the eye of the needle. Rough or uneven thread which does not slip easily through the eye of the needle interferes with the operation of the machine.

179. Relative Sizes of Needles and Threads

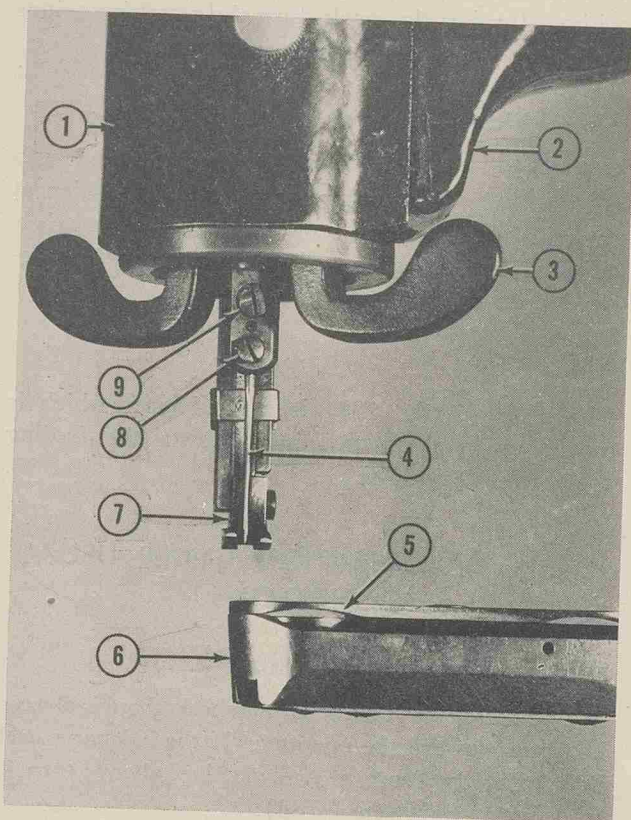
Sizes of needles and thread which correspond are listed below:

Needle No.	Wedge and twist points of thread for leather work (29 x 4)		
	Cotton	Silk	Linen
11.....	80, 100.....	24, 30	.....
13.....	80.....	24	.....
14.....	60, 80.....	20	.....
16.....	40, 60.....	16, 18	.....
17.....	40.....	16	.....
18.....	30, 40.....	10, 12	.....
19.....	24, 30.....	.....	60, 80
21.....	20, 24.....	.....	40, 60
22.....	16, 20.....	.....	25, 40
23.....	12, 16.....	.....	16, 25

180. Setting Needle

Raise the needle bar (6, fig. 173) to its highest point. Loosen the needle bar needle clamping screw (8, fig. 172) and insert the shank of the needle up into the needle clamp as far as it will go. The long groove of the needle should face to the left, and the eye of the needle should be directly in line with the

arm of the machine. Tighten the needle bar needle clamping screw. Loosen the needle bar clamp screw (9) and move the clamp to the right or left until the needle will pass through the center of the hole in the needle plate when the needle descends. When clamped in the correct position, tighten the needle bar clamp screw. Be sure to use a straight needle at all times.



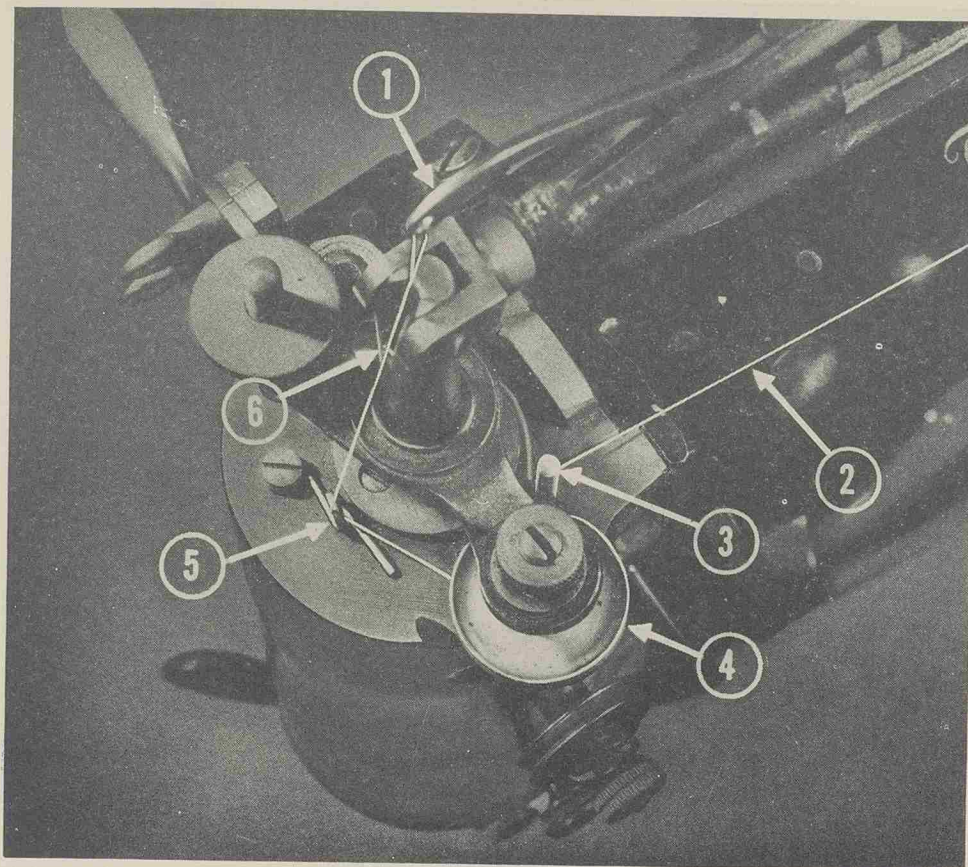
Ref. No.	Nomenclature
1	Head.
2	Arm.
3	Revolving wing.
4	Needle.
5	Needle plate.
6	Shuttle-driving gear box.
7	Feeding foot.
8	Needle bar needle clamping screw.
9	Needle bar clamp screw.

Figure 172. Setting needle.

181. Threading Needle

a. Place a reel of thread on the spool pin on the arm (4, fig. 169) of the machine, so that the thread will draw from the rear of the spool.

b. Raise the wire guide in the oil cup (2) on top



Ref. No.	Nomenclature
1	Take-up lever.
2	Needle thread.
3	Head revolving bush friction spring pin.
4	Thread tension disks.
5	Thread eyelet.
6	Thread hole in top of needle bar.

Figure 173. Threading needle for stitching—top threading.

of the arm.

c. Pass the thread under the wire guide and press the wire guide back down into position.

d. Pass the thread to the rear of the head revolving bush friction spring pin (3, fig. 173), then from rear to front and from right to left between the tension disks (4).

e. Pass the thread through the wire thread eyelet (5).

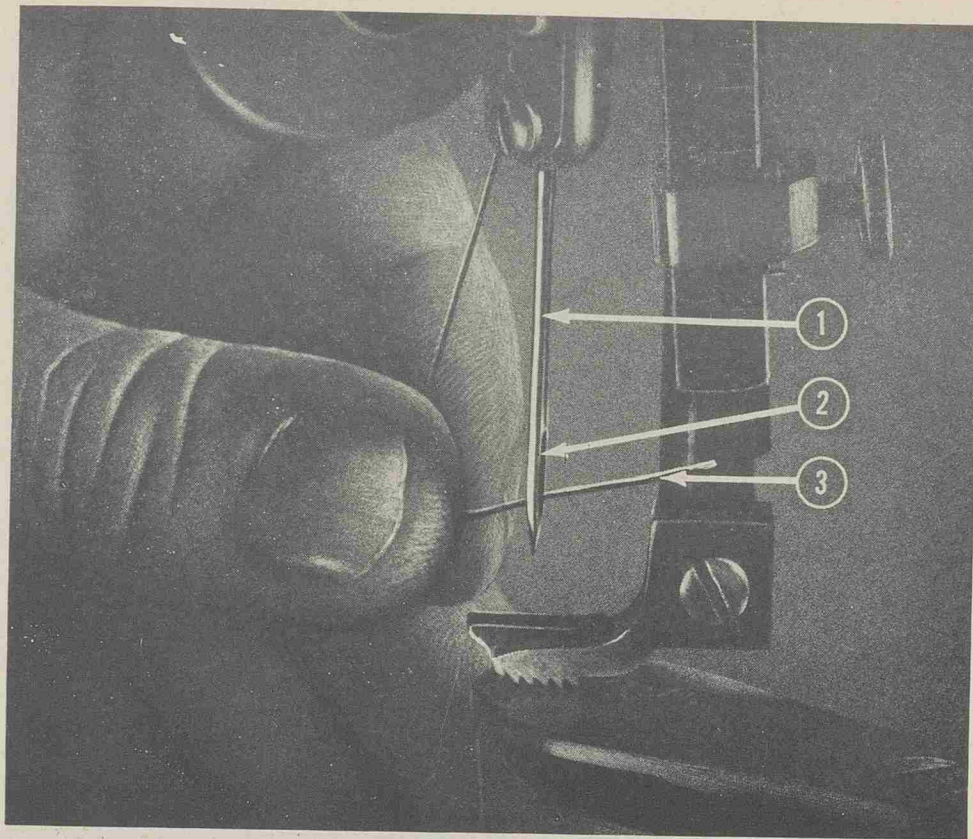
f. Pass the thread up from the wire eyelet and from front to rear through the hole in the end of the take-up lever (1).

g. Pull about 10 inches of thread through the mechanism which has just been threaded.

h. Insert the end of the thread into the slit in the end of the threading wire (1, fig. 170), which is found among the tools shipped with the machine.

i. Use the threading wire to pass the thread from the rear of the take-up lever down through the hole in the center of the top of the needle bar. (See 6, fig. 173.)

j. When thread appears at the hole in the lower section of the needle bar, remove thread from threading wire.



Ref. No.	Nomenclature
1	Needle.
2	Eye of needle.
3	Needle thread.

Figure 174. Threading needle for stitching—needle threading.

k. Pass the end of the thread (3, fig. 174) from left to right through the eye of the needle (2, fig. 174), so that it extends 3 or 4 inches beyond the needle. This length of thread is used when sewing is begun.

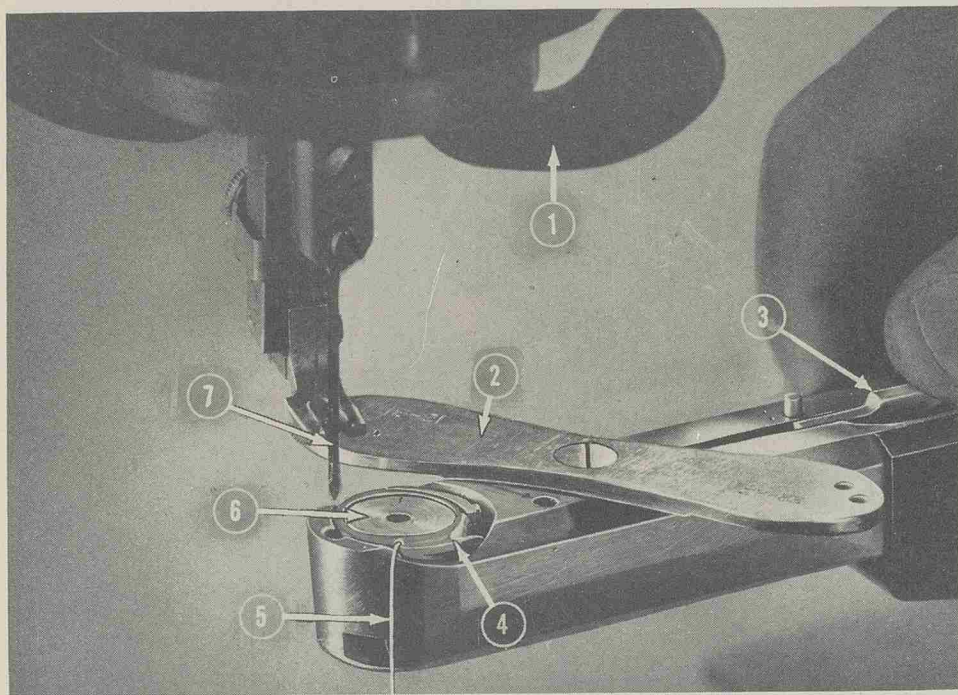
182. Removing Bobbin

- Raise the needle bar (6, fig. 173) to its highest point.
- Raise the feeding foot (7, fig. 172) by raising the lifter. (See 3, fig. 188.)
- Press down the needle plate releasing lever (3, fig. 175) and swing the needle plate (2) across the shuttle driving gear box. (See 6, fig. 172.)
- Turn the balance wheel until the point of the shuttle (4, fig. 175) is nearest to operator.
- Lift the shuttle out with the thumb and forefinger as in figure 176.

f. Turn the shuttle over and the bobbin (6, fig. 175) will drop out.

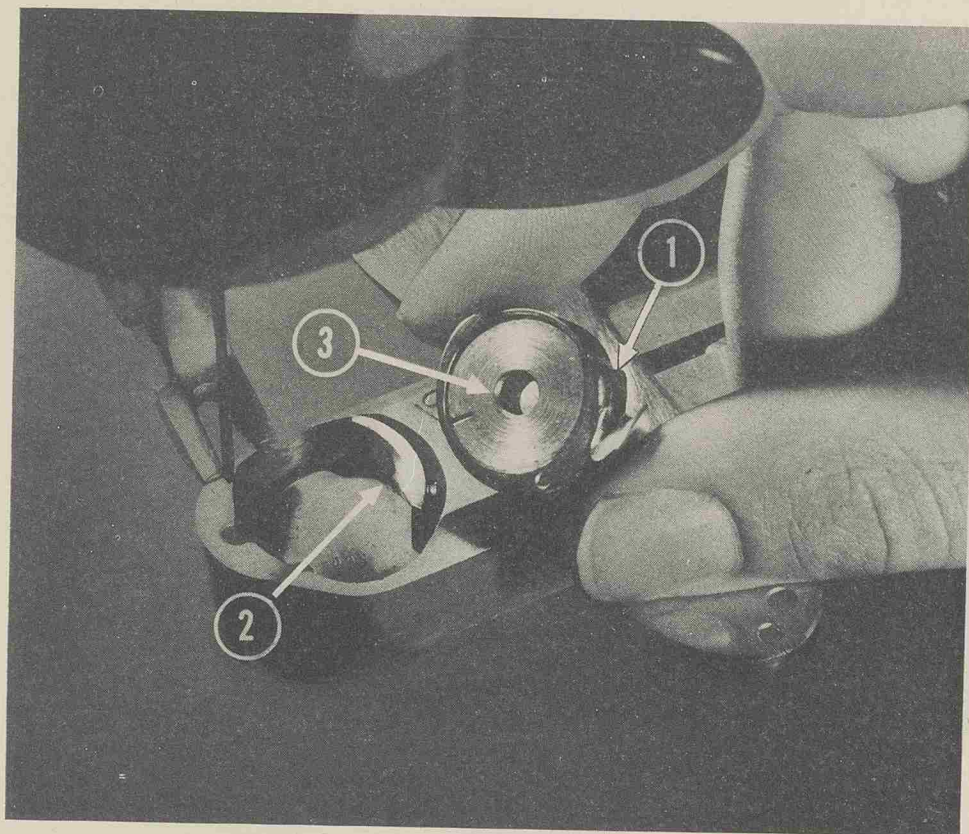
183. Adjusting Balance Wheel for Bobbin Winding

The balance wheel stop motion plunger (3, fig. 177) may be adjusted so that the balance wheel will run free when the treadle is operated, without operating the remainder of the head of the machine. To loosen the wheel on the shaft, pull out the balance wheel stop motion plunger (3, fig. 177) and turn the knurled head of the plunger slightly to the left or right. The wheel will then turn in either direction without operating the head of the machine. To connect the motion of the balance wheel with the head of the machine again, turn the head of the plunger slightly and at the same time turn the balance wheel slowly. As the wheel turns, the plunger will engage the hole in the inner disk on the shaft.



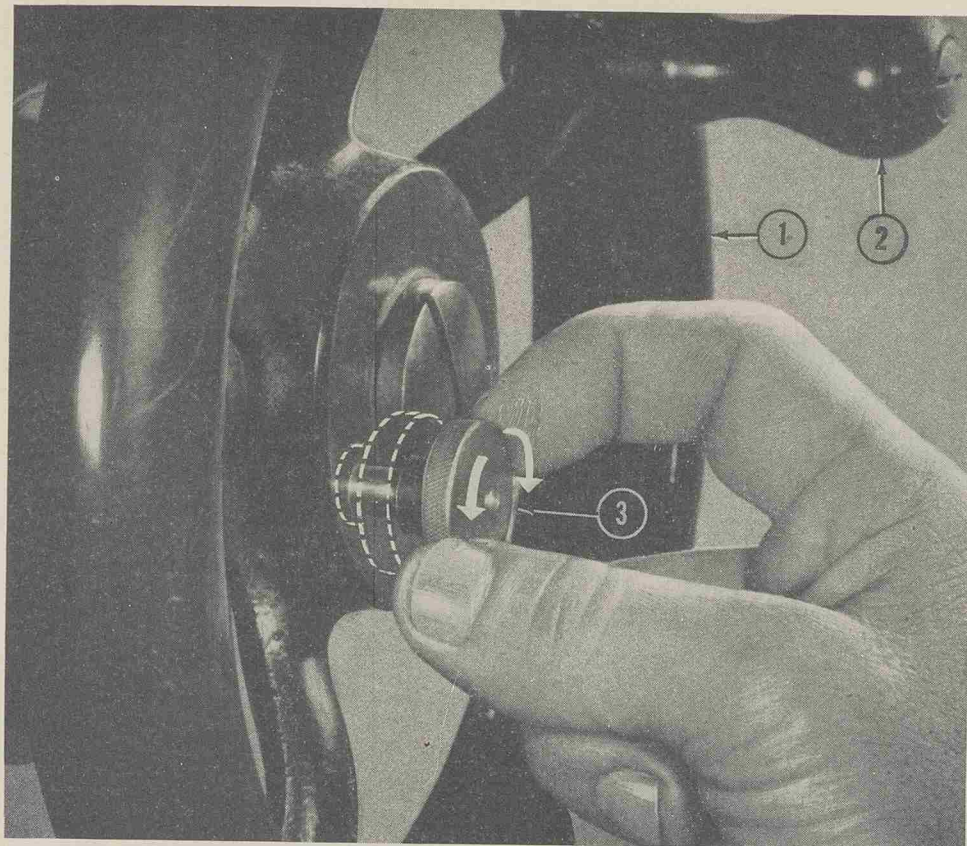
Ref. No.	Nomenclature
1	Revolving wing.
2	Needle plate.
3	Needle plate releasing lever.
4	Point of shuttle.
5	Bobbin thread.
6	Bobbin.
7	Needle.

Figure 175. Removing bobbin—step one.



<i>Ref. No.</i>	<i>Nomenclature</i>
1	Shuttle.
2	Shuttle carrier.
3	Bobbin.

Figure 176. Removing bobbin—step two.



Ref. No.	Nomenclature
1	Balance wheel.
2	Balance wheel handle.
3	Balance wheel stop motion plunger.

Figure 177. Setting balance wheel for bobbin winding.

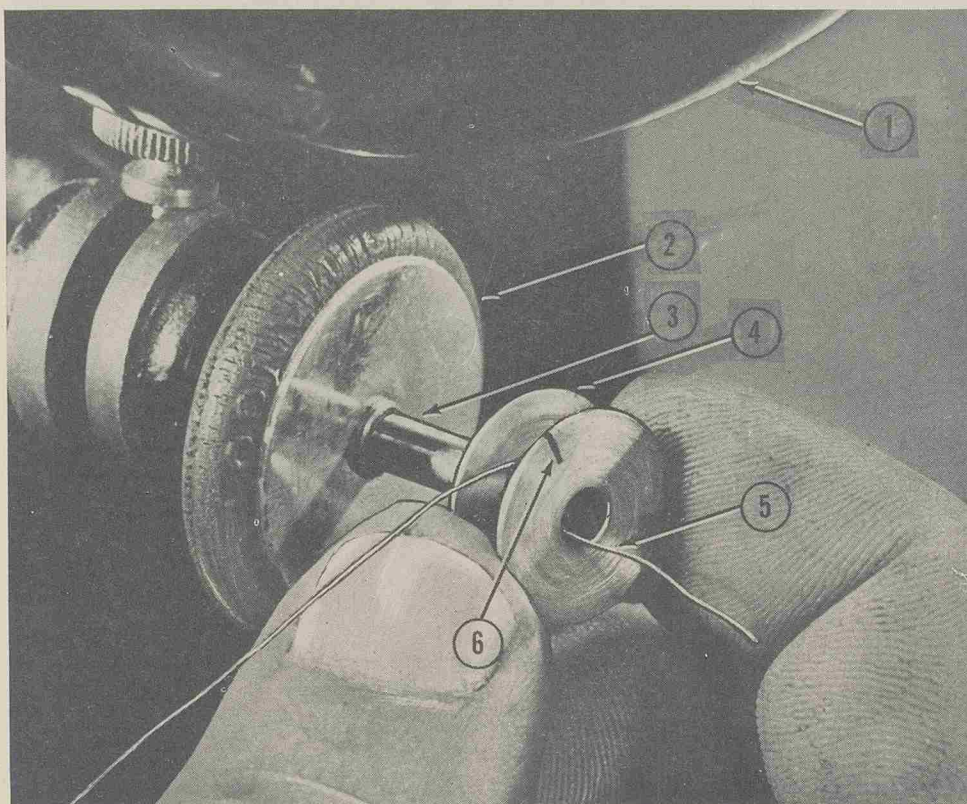
184. Preparing Bobbin for Winding

Loosen the balance wheel on the shaft, as described in paragraph 183. Place a spool of thread on the spool pin of the arm of the machine. Pass the end of the thread through the bobbin winding thread guide (11, fig. 169) and into the hole in the center of the bobbin. Then press the bobbin (4, fig. 178) on to the bobbin winder spindle (3) as far as it will go. The position of the bobbin on the bobbin winder spindle varies in the different models of the patching machine as follows:

- a. MODEL 29K70. The slot in the side of the bobbin (6) should be placed to the inside.
- b. MODELS 29K58 AND 29K62. The slot in the side of the bobbin should be placed to the outside.
- c. MODEL 29K60. The slot in the center of the bobbin should engage the pin on the spindle.

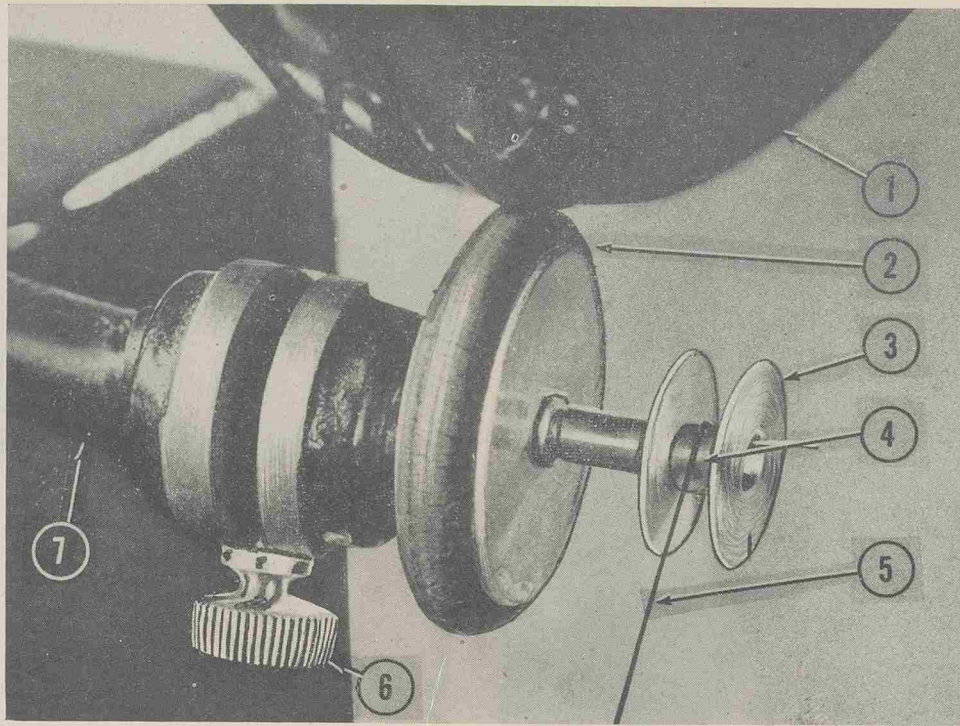
185. Winding Bobbin

Loosen the thumbscrew (6, fig. 179) on the bobbin winder, and lower it in the slot until the rubber ring (2) presses against the balance wheel. Then tighten the thumbscrew. Turn the top of the balance wheel forward and pick up the motion of the balance wheel by operating the treadle with the feet. Thread should be wound on the bobbin until it is just short of being level full. When the bobbin is sufficiently full, remove it from the spindle. Cut the thread between the bobbin and the spool. Pass the end of the bobbin thread into the slot in the edge of the bobbin. Loosen the thumbscrew on the bobbin winder, and move the thumbscrew up in the slot so that the rubber ring moves down and away from the balance wheel. Tighten the thumbscrew. (If the balance wheel is fitted on the front of the machine, the position of the bobbin on the bobbin winder



Ref. No.	Nomenclature
1	Balance wheel.
2	Bobbin winder spindle pulley.
3	Bobbin winder spindle.
4	Bobbin.
5	Thread.
6	Slot in side of bobbin.

Figure 178. Placing bobbin on bobbin winder.



Ref. No.	Nomenclature
1	Balance wheel.
2	Bobbin winder spindle pulley.
3	Bobbin.
4	Bobbin winder spindle.
5	Thread.
6	Bobbin winder eccentric thumbscrew.
7	Bobbin winder frame.

Figure 179. Winding bobbin.

spindle as described in paragraph 184 must be reversed. The top of the balance wheel then must be turned to the right so that the thread will be wound on the bobbin in the proper direction.)

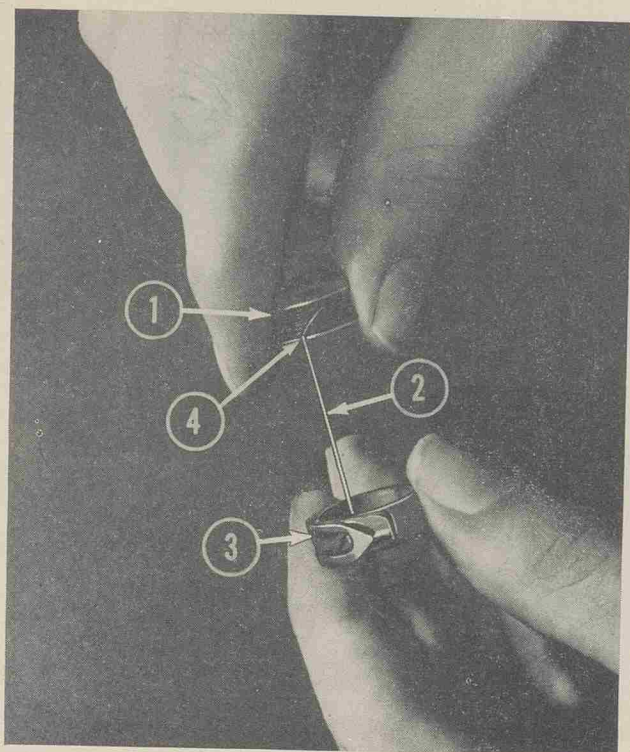
186. Threading Shuttle

Because the shuttle in model 29K60 differs from those in the other three models, the procedure for threading the shuttle of model 29K60 also differs from that for the other three models.

a. THREADING PROCEDURE FOR MODEL 29K60. Hold the bobbin in the right hand with the thread leading from right to left. With the left hand, hold the shuttle with its open end up and its retaining spring turned outwards. Then place the bobbin into it and push back the spring in order to retain the bobbin in the shuttle. With the right hand, draw the thread into the slot in the edge of the shuttle as far

as it will go. Then pull the thread to the left, up, and to the right, so that the thread will lie at the back of the spring. Pass the end of the thread up through the small hole in the edge of the shuttle, then through the eye in the top of the bobbin position post.

b. THREADING PROCEDURES FOR MODELS 29K58, 29K62, AND 29K70. (1) *Step one.* Having removed the bobbin from the bobbin winder, take it between the thumb and forefinger of the right hand, with the slot in the edge of the bobbin (4, fig. 180) at the bottom. Allow 2 or 3 inches of thread to hang free from the bobbin. Hold the shuttle between the thumb and forefinger of the left hand (fig. 180), with the wide opening of the shuttle uppermost. Let the end of the thread pass through the shuttle and drop the bobbin into the shuttle in that position.



Ref. No.	Nomenclature
1	Bobbin (loaded).
2	Thread.
3	Shuttle.
4	Slot in edge of bobbin.

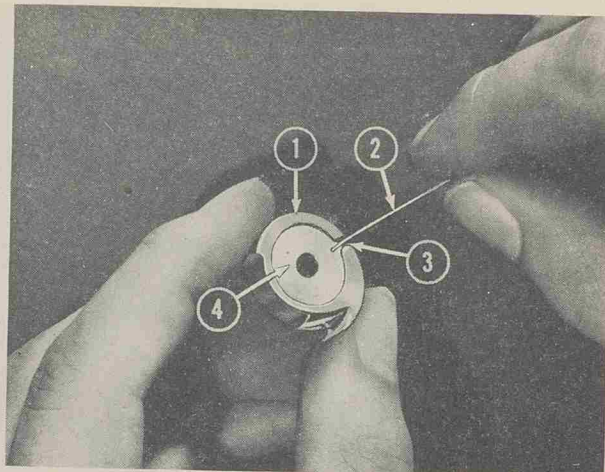
Figure 180. Threading shuttle—step one.

(2) *Step two.* Hold the bobbin in the shuttle and turn the shuttle over. (See fig. 181.) Draw the thread into the slot in the edge of the shuttle (3) and under the end of the tension spring.

(3) *Step three.* Pass the end of the thread up through the small hole in the upper edge of the shuttle. (See 3, fig. 182.)

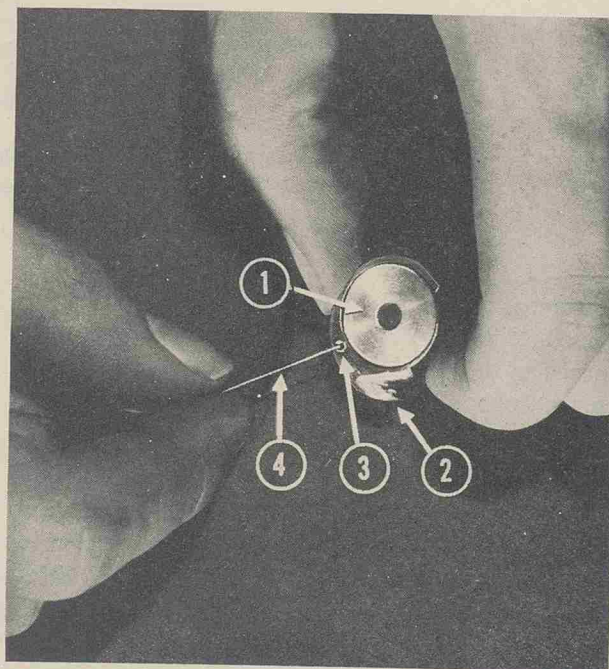
187. Replacing Shuttle

After threading the shuttle, turn the balance wheel until the upright part of the shuttle carrier (2, fig. 176) is to the right. With the point of the shuttle nearest to the operator, and pointing toward the right, drop the shuttle and the bobbin into the recess provided for them. (See fig. 176.) Raise the needle bar to its highest point, press the lever (3, fig. 165), and turn the needle plate (2) back to its sewing position.



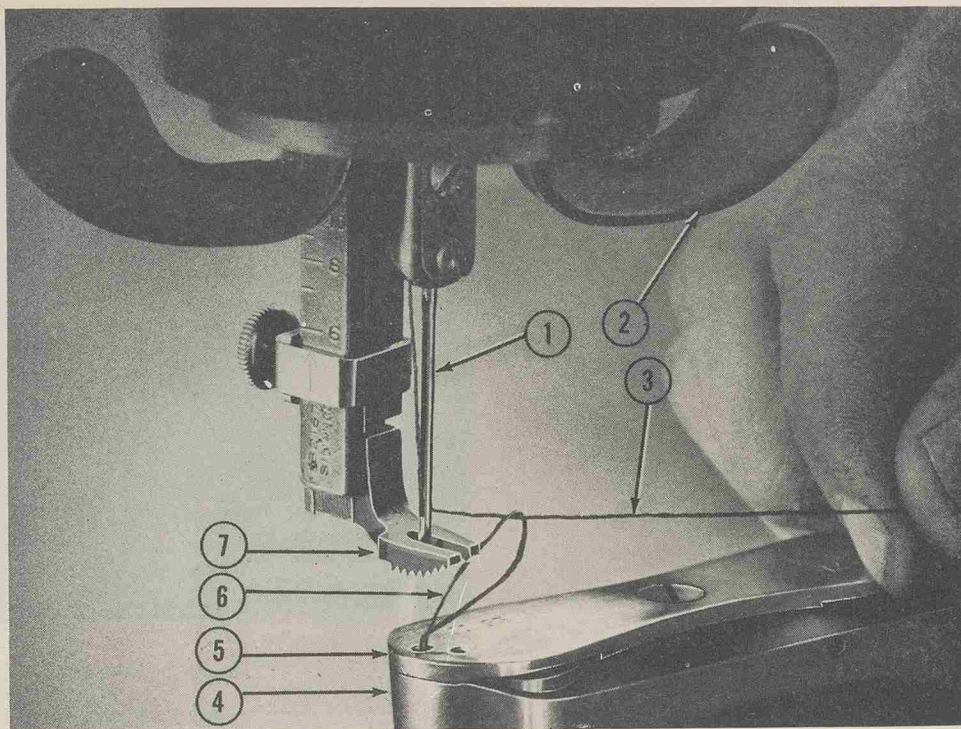
Ref. No.	Nomenclature
1	Shuttle.
2	Bobbin thread.
3	Slot in edge of shuttle.
4	Bobbin.

Figure 181. Threading shuttle—step two.



Ref. No.	Nomenclature
1	Bobbin.
2	Point of shuttle.
3	Hole in upper edge of shuttle.
4	Bobbin thread.

Figure 182. Threading shuttle—step three.



Ref. No.	Nomenclature
1	Needle.
2	Revolving wing.
3	Needle thread.
4	Shuttle-driving gear box (rack box).
5	Needle plate.
6	Bobbin thread.
7	Feeding foot.

Figure 183. Preparation for sewing.

188. Preparation for Sewing (fig. 183)

With the left hand, hold the end of the needle thread (3, fig. 183), leaving it quite slack between the hand and the needle. Turn the top of the balance wheel forward until the needle moves down and up again to its highest point. The motion of the needle catches the under (bobbin) thread. Then pull the end of the thread which is being held. As that thread tightens, it will pull the bobbin thread (6) up through the hole in the needle plate (5). Lay the ends of both threads to the rear and under the feeding foot (7).

189. Sewing

Place the material under the feeding foot and lower the foot upon the material by pulling down the lifter. (See 3, fig. 188.) Start the machine by pulling the top of the balance wheel forward, and continue the

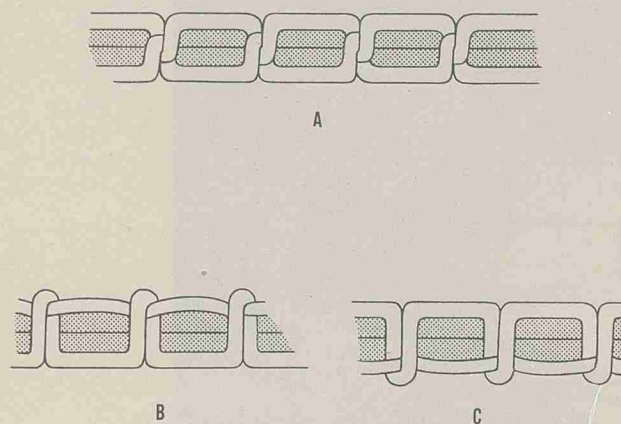
motion of the machine by operating the treadle with the feet. Proceed to sew the material as described in paragraphs 175 and 176. **Caution:** Do not try to help the feeding of the work by pulling the material. Pulling the material may deflect the downward path of the needle, causing the needle to strike the needle plate and break. The machine feeds itself without any assistance.

190. Removing Work from Machine

Raise the needle bar to its highest point by turning the balance wheel. Lift the feeding foot (7, fig. 183) by raising the lifter (3, fig. 188), and pull the material about 3 inches to the rear of the needle. Cut both threads close to the work. Leave the ends of both threads under the feeding foot.

191. Effect of Thread Tension on Stitch

For ordinary stitching, the tension of the needle and bobbin threads should be equal, and just strong enough to lock both threads in the center of the work. (See fig. 184, A). If the tension on one of the two threads is stronger than the tension on the other, an imperfect stitch will be formed. (See fig. 184, B and, C).



A. Correct stitch.
B. Needle thread tension too strong.
C. Needle thread tension too weak.

Figure 184. Effect of thread tension on stitch.

192. Regulating Tension on Needle Thread

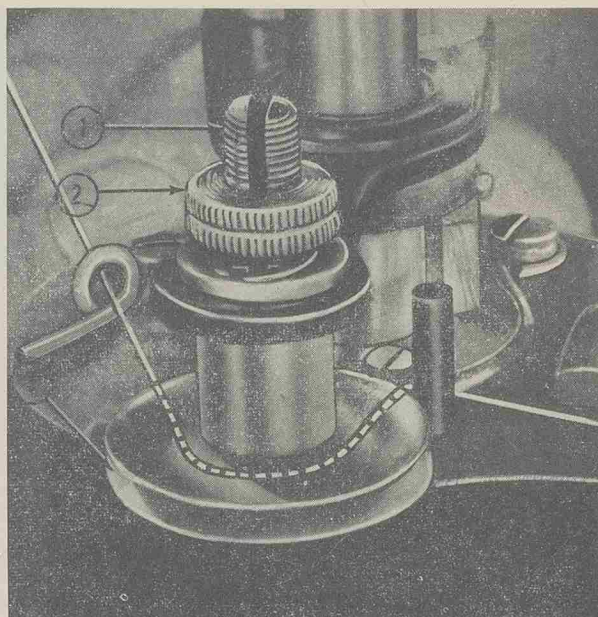
The tension on the needle thread as it passes between the tension disks (3, fig. 185) is regulated by the tension adjusting stud thumb nut (2). To increase the tension on the thread, grasp the thumb nut with the right hand and turn the nut to the right. To decrease the tension on the thread, grasp the thumb nut with the right hand and turn the nut to the left.

193. Regulating Tension on Bobbin Thread

Nearly all machines are correctly adjusted before they leave the factory. Therefore, it is seldom necessary to adjust the tension of the bobbin thread in the field. The tension on the bobbin thread is controlled by the small screw in the end of the tension spring in the side of the shuttle. To increase the tension on the bobbin thread, tighten this screw. To decrease the tension on the thread, loosen the screw.

194. Regulating Tension on Thread Take-Up Lever

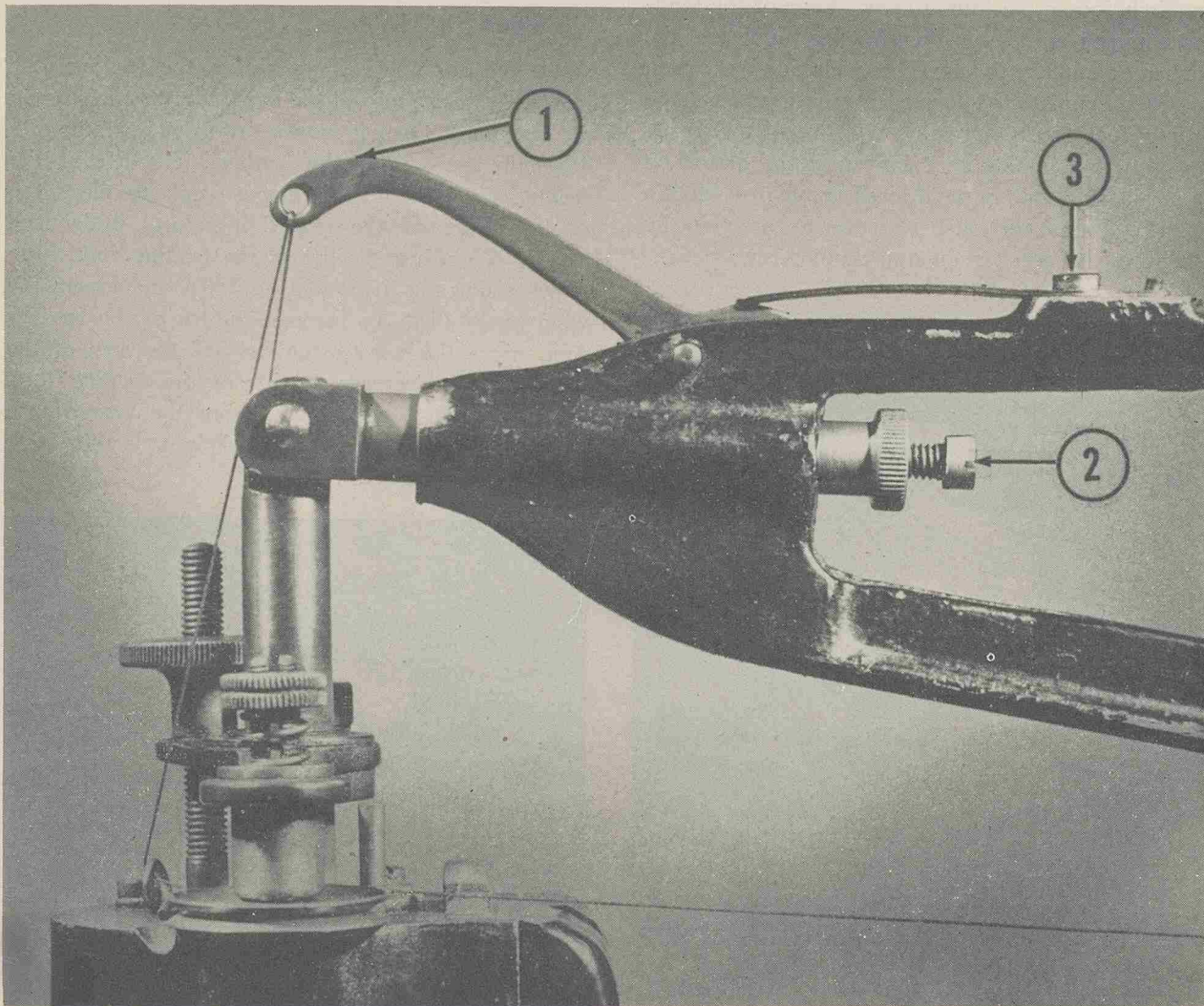
The spring tension on the thread take-up lever (1, fig. 186) is controlled by the check lever tension



Ref. No.	Nomenclature
1	Tension adjusting stud.
2	Tension adjusting stud nut.
3	Tension disks.

Figure 185. Regulating needle thread tension.

stud nut (3). The tension on the take-up lever should be set to work smoothly with the needle thread tension as it is controlled by the tension disks. (See 3, fig. 185.) When the stitch is set, at the top of the needle bar stroke, the take-up lever (1, fig. 186) should be held down far enough by the tension of the thread so that the take-up action of the lever will keep the thread taut until the needle enters the goods. When lightweight materials are being sewed with fine thread, increase the take-up action by decreasing the tension on the take-up spring, not by tightening the tension disks. To decrease the tension on the take-up spring, loosen the check lever tension stud nut (3). To increase the tension on the take-up spring, tighten the check lever tension stud nut. When heavier materials are being sewed with coarser thread, the tension on the take-up lever must be increased or decreased as the tension on the needle thread in the tension disks is increased or decreased. The check lever thread take-up adjusting screw and its lock nut (2) are set at the factory to allow the correct amount of take-up lever movement, and they should not be disturbed in the regulation of the tension on the take-up lever.

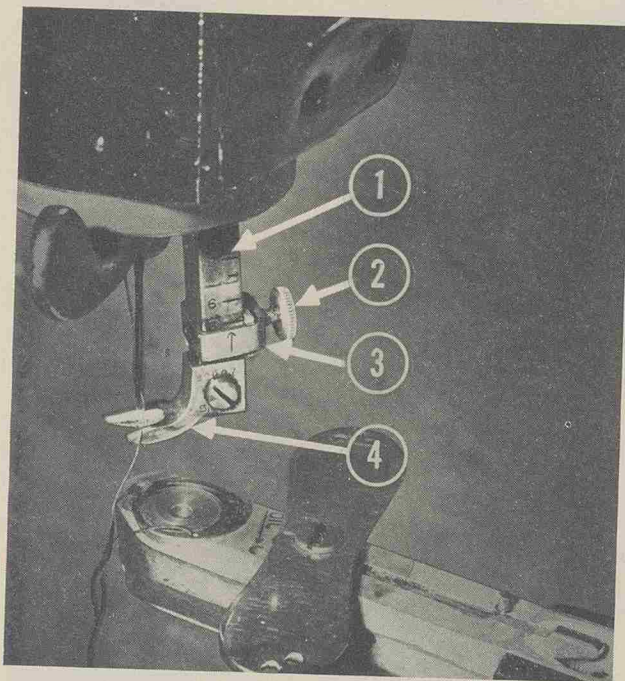


Ref. No.	Nomenclature
1	Take-up lever.
2	Check lever thread take-up adjusting screw nut.
3	Check lever tension stud nut.

Figure 186. Regulating tension on take-up lever.

195. Regulating Length of Stitch (fig. 187)

The length of stitch is governed by the stitch regulator (3, fig. 187), which is held in position at the rear of the feeding foot bar (1) by the stitch regulator thumbscrew (2). To change the length of the stitch, loosen the thumbscrew. Each of the numbers stamped on the feeding foot bar indicates the number of stitches that will be made per inch when the stitch regulator is located at that point on the feeding foot bar. Move the stitch regulator up or down on the feeding foot bar until the arrow on the regulator points to the desired number of stitches per inch. Secure the stitch regulator at that point by tightening the stitch regulator thumbscrew.



Ref. No.	Nomenclature
1	Feeding foot bar.
2	Stitch regulator thumbscrew.
3	Stitch regulator.
4	Feeding foot.

Figure 187. Regulating length of stitch.

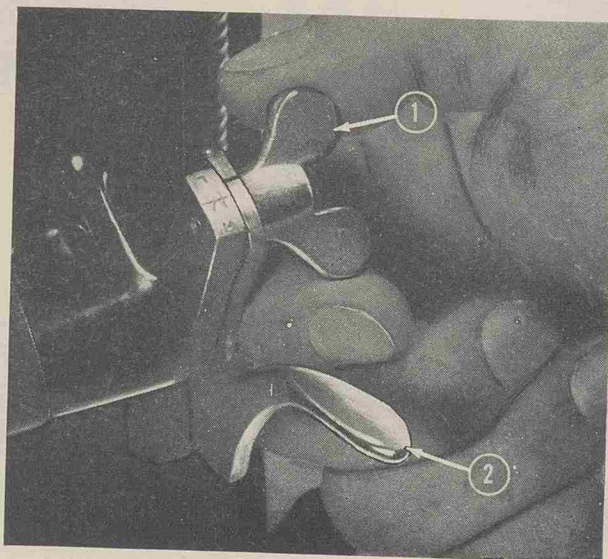
196. Regulating Pressure of Feeding Foot on Material

Sewing leather requires a heavier pressure of the feeding foot than sewing cloth or cotton materials. In either case, however, the pressure of the feeding foot should be just heavy enough to feed the work evenly under the needle. The pressure on the mate-

rial is regulated by the vibrating presser spring bar adjusting nut. (See 2, fig. 188.) To increase the pressure on the work, tighten the nut. To decrease the pressure on the work, loosen the nut.

197. Regulating Automatic Lift of Feeding Foot (fig. 189)

While the machine is in operation, the feeding foot rises after it has moved the work toward the rear of the machine. Then it moves toward the needle and descends again upon the leather. The lift of the feeding foot should be just enough to clear the thickest part of the material passing under the needle. To adjust the lift of the feeding foot, raise it by raising the lifter (2, fig. 189), and loosen the wing screw (1). To increase the lift of the feeding foot, move the wing screw toward the arm of the machine. To decrease the lift of the feeding foot, move the wing screw away from the arm of the machine. When the desired height is obtained, tighten the wing screw.



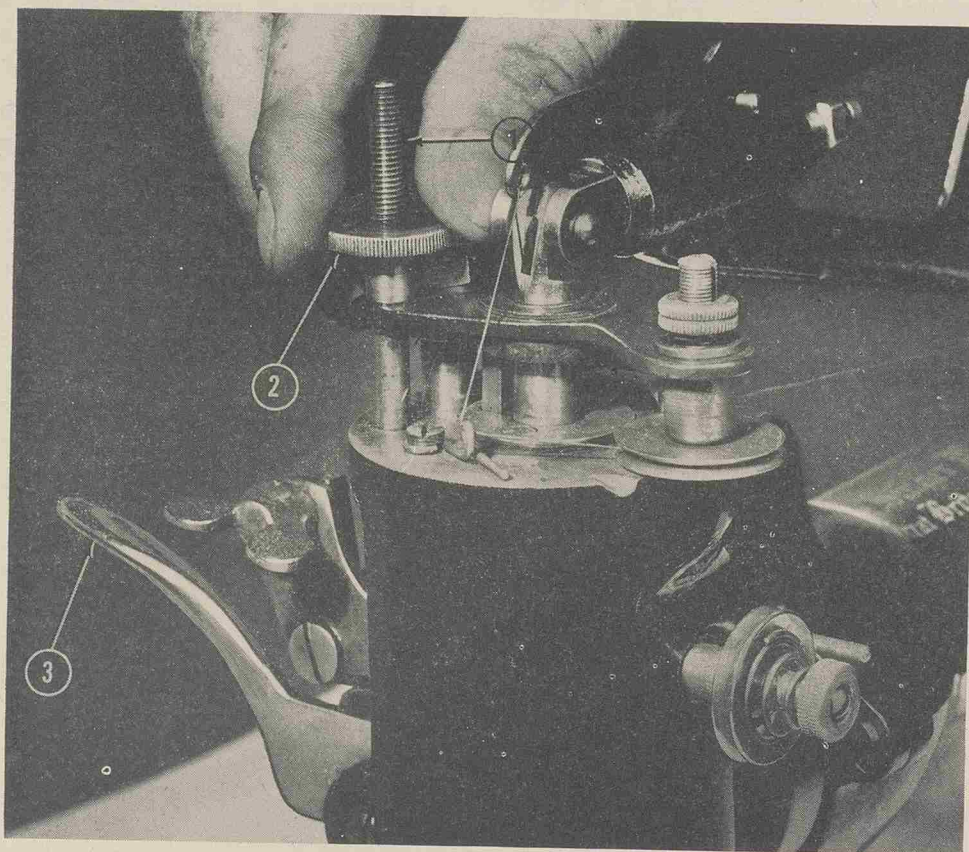
Ref. No.	Nomenclature
1	Vibrating presser lifting lever shaft adjusting lever clamping screw.
2	Lifter.

Figure 189. Regulating automatic lift of feeding foot.

Section VII. OPERATION UNDER UNUSUAL CONDITIONS

198. Temperature Extremes

Extremes of heat and cold which the operator can



Ref. No.	Nomenclature
1	Vibrating presser spring bar.
2	Vibrating presser spring bar adjusting nut.
3	Lifter.

Figure 188. Regulating pressure on material.

endure have little or no effect upon the patching machines.

199. Humidity

a. EFFECT ON LUBRICATION. Normal humidity may cause the machines to rust unless they are oiled thoroughly. When the humidity increases, the light-weight oil used on these machines will not protect them from rust and wear if the normal lubrication schedules are followed. Therefore, when operating under conditions of high humidity, decrease the intervals of the lubrication schedules listed in paragraphs 204 and 205.

b. EFFECT ON THREAD. High humidity causes the thread to rot and break easily. Therefore, when operating under humid conditions, keep the thread as dry as possible.

Section VIII. DEMOLITION TO PREVENT ENEMY USE

200. General

In a theater of war, it may be necessary to destroy the patching machine quickly in order to deny its use to the enemy.

201. Procedure

a. REMOVAL. If possible, move the machine and its supplies out of the danger zone to some safe location.

b. DESTRUCTION. Machines should be destroyed only upon the orders of higher authority. Destruction must be complete. The same essential parts of all machines must be demolished to prevent the enemy from assembling one complete machine from the usable parts of several damaged machines. Using the ax or mattock supplied with the repair trailer, thoroughly smash the stand, the head, and all head assemblies. Burn all supplies which are inflammable. Bury the remaining spare parts and supplies.

PART THREE

MAINTENANCE INSTRUCTIONS

Section IX. SPECIAL ORGANIZATION TOOLS AND EQUIPMENT

202. Tools

a. TOOLS SUPPLIED WITH TWO-WHEEL SHOE REPAIR TRAILER. The following tools are supplied with the patching machine when it is installed on the two-wheel shoe repair trailer:

Vendor's part No.	Vendor's nomenclature	Quantity
8590.....	Needle bar threading wire..	1
36569.....	Oiler	1
25537.....	Screw driver	1
120378.....	Screw driver	1

b. TOOLS SUPPLIED WITH SHOE REPAIR SEMI-TRAILER. In addition to the tools listed above, the following tools for the patching machine are supplied with the shoe repair semitrailer:

Federal stock No.	Standrad nomenclature	Quantity
41-W-1596-100...	Wrench, open-end, single-head, straight.	1
41-W-1585-100...	Wrench, open-end, double-head, straight and angle.	1
41-W-1584-305...	Wrench, open-end, double-head, straight.	1
41-W-1584-200...	Wrench, open-end, double-head, 45° and 90°.	1

c. OTHER TOOLS. Wherever applicable, the tools issued for use with the generator and other machines on the trailers may be used in the maintenance of the patching machine.

203. Spare Parts

A 6-month supply of the following spare parts for the patching machine is issued with the two-wheel

shoe repair trailer:

Vendor's part No.	Vendor's nomenclature	Quantity
8604	Shuttle bobbin	6
82219	Check lever spring.....	1
8666	Feeding foot	1
193F	Feeding foot screw.....	1
8656	Needle bar thread tension spring.	1
SS133D	Needle bar thread tension spring screw.	1
82222	Needle plate (with shuttle clearance).	1
8603	Shuttle (complete)	1
8611	Shuttle tension spring.....	2
82178	Shuttle carrier driving pinion.	1
82180	Shuttle carrier following pinion.	1

Section X. LUBRICATION

204. Lubrication Chart

a. The lubrication chart presented in figure 190 prescribes first and second echelon lubrication maintenance.

b. The service intervals specified in the lubrication chart are for normal operating conditions. Under extreme conditions, such as excessively high or low temperatures, prolonged periods of high speed, continued operation in sand or dust, immersion in water, or exposure to moisture, the intervals should be reduced. Failure to reduce them may result in malfunctioning or damage to the machine.

c. The lubricant prescribed in the KEY is an all-temperature lubricant for purposes of this machine. Lubricating oil (MO) is a highly refined, low pour point mineral oil which may be used at any temperature higher than -50° F.

205. Detailed Lubrication Instructions

a. LUBRICATION EQUIPMENT. Each patching machine is supplied with lubrication equipment adequate to maintain it. Make certain this lubrication equipment is cleaned both before and after use. Operate the equipment carefully and in such a

manner as to insure a proper distribution of the lubricant.

b. POINTS OF APPLICATION. Lubrication fittings and oil points are readily located by reference to the lubrication chart, which is supplemented by individual photographs of the points of lubrication. (See figs. 191 to 197.) Wipe oil points and surrounding surfaces clean before applying lubricant.

c. CLEANING. Use dry-cleaning solvent or Diesel fuel oil to clean or wash all parts. Use of gasoline for this purpose is prohibited. After washing, dry all parts thoroughly before applying lubricant.

d. LUBRICATION NOTES ON INDIVIDUAL UNITS AND PARTS. The following instructions supplement those notes in the lubrication chart which pertain to lubrication and service of individual units and parts:

(1) *Bobbin winder.* Twice every day, add a drop of oil to the bobbin winder spindle and eccentric.

(2) *Arm assembly.* Twice every day, add a drop of oil to the following moving parts:

- (a) Arm shaft (two points).
- (b) Balance wheel.
- (c) Shuttle-driving lever-connecting rod.
- (d) Shuttle-driving cam arm.
- (e) Feed motion cam wheel.
- (f) Shuttle-driving lever-connecting rod.
- (g) Vibrating presser-lifting lever.

(3) *Needle bar driving lever.* Twice every day, add a drop of oil to the following moving parts:

- (a) Needle bar driving lever joint pin.
- (b) Take-up lever.
- (c) Take-up lever regulator.
- (d) Needle bar piston joint.

(4) *Foot assembly.* Twice every day, add a drop of oil to the following moving parts:

- (a) Needle plate releasing lever.
- (b) Needle plate screw.
- (c) Shuttle-driving pinion.
- (d) Rack.

Note. Rub a little oil over the face of the shuttle race every time the above parts are oiled.

(5) *Face assembly.* Twice every day, add a drop of oil to the following moving parts:

- (a) Vibrating presser spring bar.
- (b) Needle bar bushing.
- (c) Tension adjusting stud.

- (d) Vibrating presser lifting lever.
- (e) Lifter.
- (f) Vibrating presser spring.
- (g) Head revolving bush handle.
- (h) Feed motion cam wheel.

e. REPORTS AND RECORDS. (1) A record of lubrication may be maintained on WD AGO Form 460.

(2) Report unsatisfactory performance of equipment and lubricants on WD AGO Form 468, to the Reclamation Branch, Field Service Division, Office of The Quartermaster General, in accordance with pertinent War Department circulars.

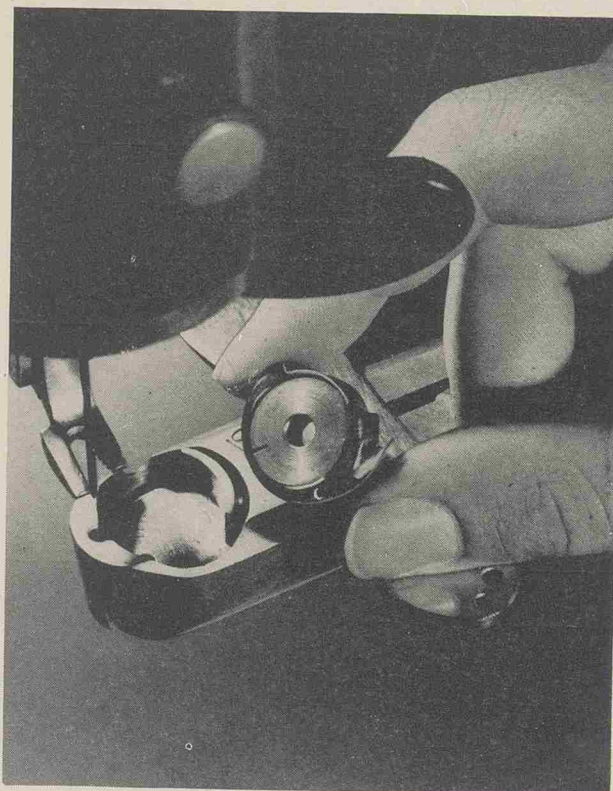
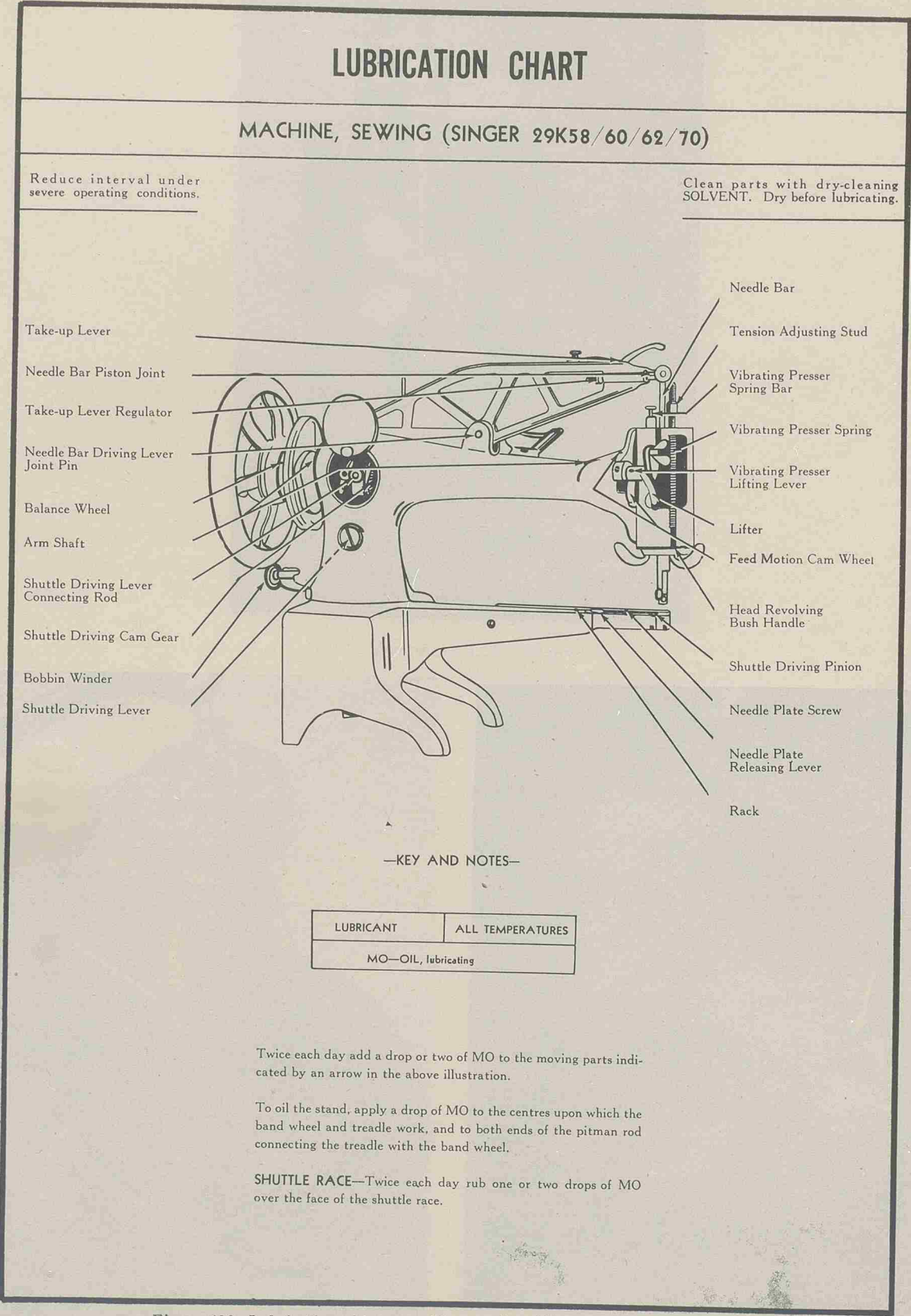


Figure 191. Shuttle race.

Section XI. PREVENTIVE MAINTENANCE

206. General

Preventive maintenance services, as prescribed by Army Regulations, are performed by the maintenance personnel of the using organization. These services consist of the before-, during-, and after-operation services; the weekly services performed by the operator; and the scheduled services performed by organizational maintenance personnel.



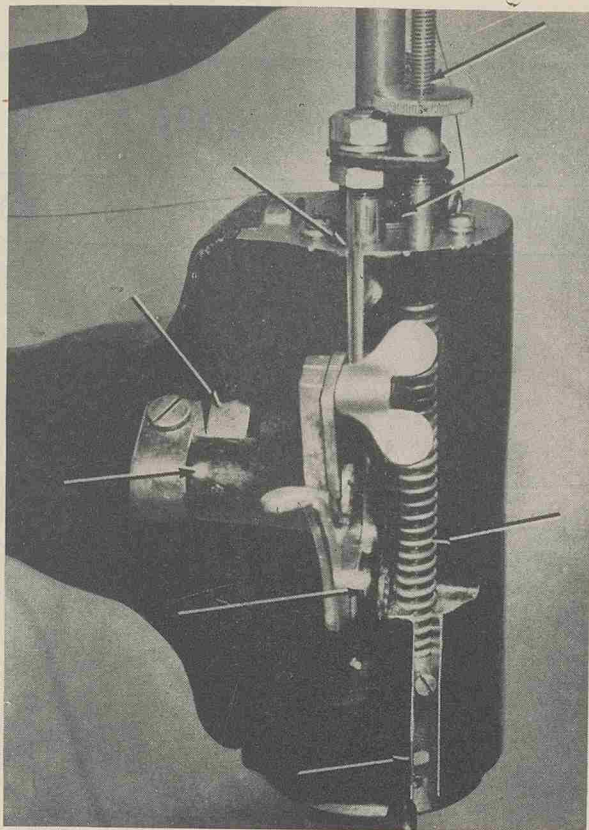


Figure 192. Face assembly.

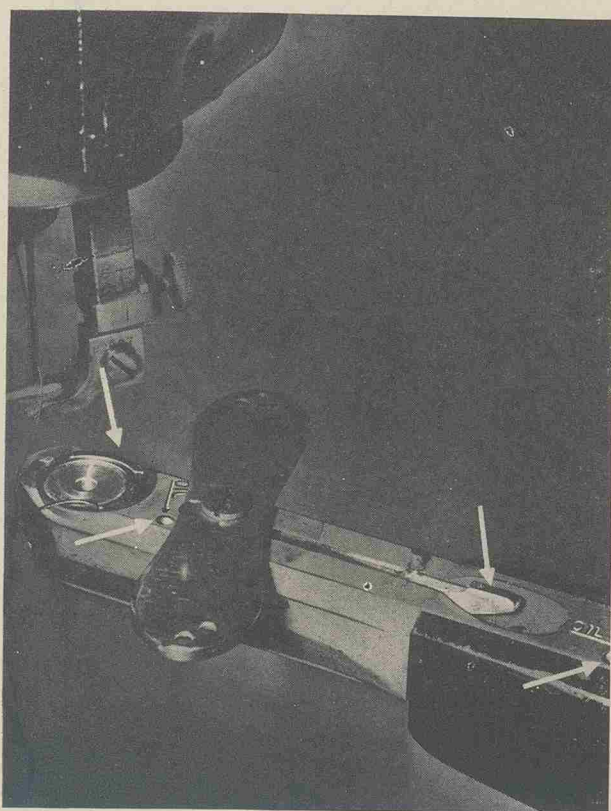


Figure 193. Shuttle-driving gear box assembly.

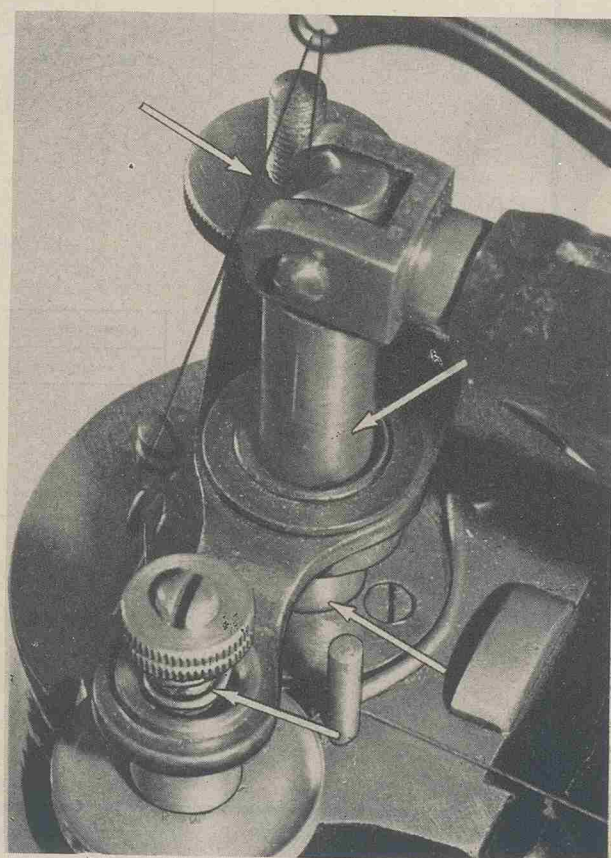


Figure 194. Foot bar revolving joint bearings.

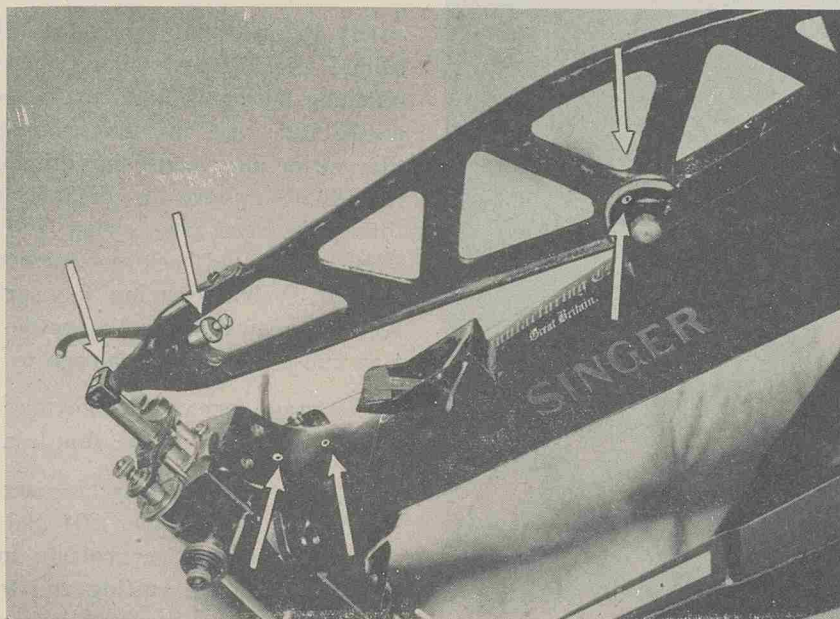


Figure 195. Needle bar driving lever.

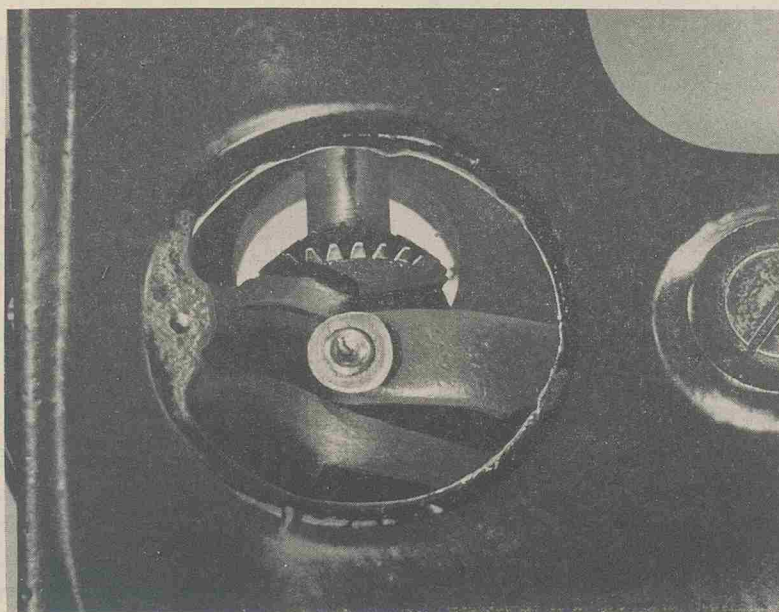


Figure 196. Shuttle-driving lever connecting rod.

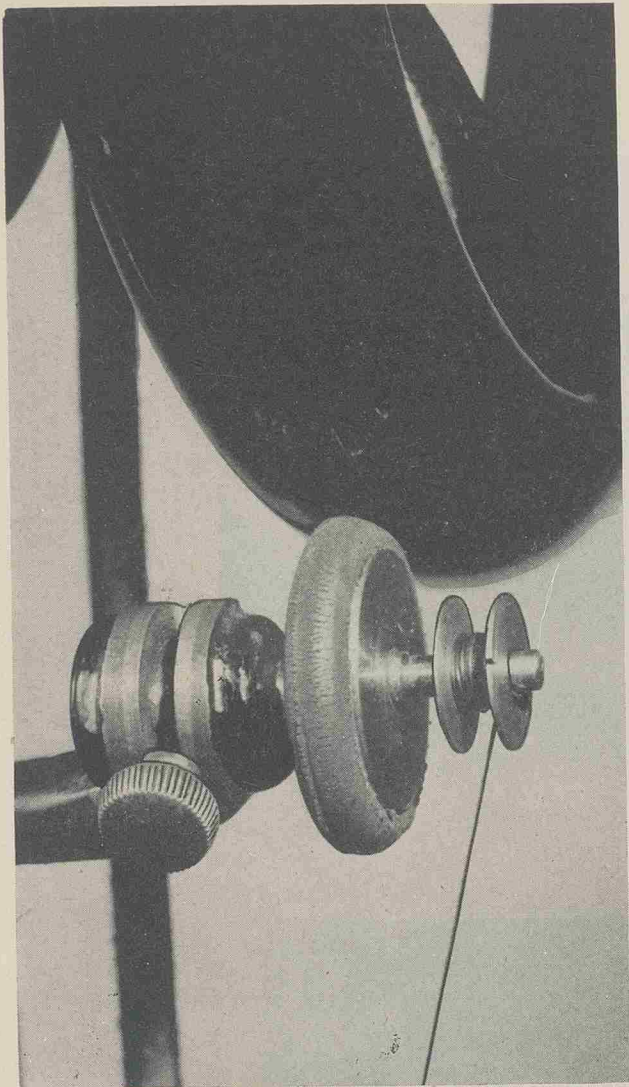


Figure 197. Bobbin winder.

207. Operator Maintenance (First Echelon)

a. BEFORE-OPERATION SERVICES. Before beginning to operate the machine, the operator should—

(1) Inspect the entire machine for evidence of tampering. Any damage should be reported to the trailer foreman or the unit mechanic.

(2) Check the belt and the controls of the machine.

(3) Lubricate the machine according to the instructions contained in paragraphs 204 and 205.

b. DURING-OPERATION SERVICE. During operation the operator should—

(1) Clean dust, grit, and lint out of the shuttle

and oil it each time a full bobbin is placed in the shuttle.

(2) Make necessary adjustments according to the directions included in part two.

(3) Remove fluff and dirt which may gather behind the thread-retaining spring. The thread-retaining spring is fitted to the bottom end of the needle bar. An excessive amount of dirt behind this spring may cause mis-stitching of the needle thread. To remove the dirt, pass a piece of tape or thread between the spring and the needle bar. Work the thread back and forth until the spring is cleaned. When cleaning the spring, do not bend the spring away from the needle bar, because this may cause permanent damage to the spring.

c. AFTER-OPERATION SERVICE. (1) Clean dirt, lint, and grit out of the shuttle and shuttle race.

(2) Lubricate the machine according to the instructions in paragraphs 204 and 205. Lubrication after operation is particularly important, to keep the machine from rusting and to allow the oil to penetrate to the bearings before the machine is operated again.

(3) Wipe all dust, lint, and excess oil off the outside of the machine.

208. Organization Maintenance

a. RESPONSIBILITY. Qualified mechanics of the using organization should perform the maintenance services detailed in this paragraph, but operators qualified to do the work should assist them.

b. REPLACING PARTS. When new parts are installed, the mechanic should make certain that each new part is well lubricated and moves freely without binding. A new part should never be forced or driven into place. The operation of a newly installed part should be tested by hand-turning the machine. If the part binds, it may get hot and warp when the machine is put into operation. If a newly installed part fits too tightly, it should be dressed down carefully to make a snug fit. For dressing down iron or steel parts, use a suitable grade of emery cloth which will leave a highly polished surface. Emery cloth should not be used on brass or other soft metal bearings, because the abrasive material may become imbedded in the metal and score the bearing surfaces of the shafts.

c. ADJUSTING AND REPLACING BELT. If the

leather driving belt becomes loose, shorten it enough to get a snug fit. Belts which are too tight will cause undue wear on the bearings. Belt pliers are convenient for cutting belting, punching new holes, and setting the belt hook. However, an awl may be used for punching holes in the belting if the special pliers are not available.

d. WEEKLY SERVICES. The machine should be inspected weekly for lubrication as described in paragraphs 204 and 205.

e. MONTHLY SERVICES. Each month, the shuttle race and face assemblies should be cleaned and lubricated as described in paragraphs 204 and 205.

Section XII. TROUBLE SHOOTING

209. General

This section contains trouble-shooting information which can be of help in determining and removing the causes of trouble which may develop in the patching machine. The principal symptoms of trouble are: needle breakage; needle thread breakage; bobbin thread breakage; skipping of stitch; and drawing of seam. Paragraphs 210 through 214 list the causes for these troubles and their remedies.

210. Causes and Remedies for Needle Breakage

Possible cause	Remedy
Needle loose in clamp...	Tighten needle clamping screw. (See par. 180.)
Needle is of incorrect class or variety.	Use needle of proper size and type for the work. (See par. 179.)
Feeding foot loose or out of line.	Straighten feeding foot and tighten feeding foot screw.
Operator pulling on material while machine is operating.	Feed material under the needle as described in paragraph 189.

211. Causes and Remedies for Needle Thread Breakage

Possible cause	Remedy
Incorrect threading of machine.	Thread machine as instructed in paragraph 181.

Upper tension too tight..	Adjust tension of the tension disks. (See par. 192.)
Needle set incorrectly...	Set needle correctly as described in paragraph 180.
Sharp edge on shuttle or tension spring.	Remove the sharp edge or bur by rubbing the part with emery cloth.
Needle rubbing against feeding foot.	Adjust and tighten feeding foot.
Defective thread	Use smooth, dry, evenly twisted thread.

212. Causes and Remedies for Bobbin-Thread Breakage

Possible cause	Remedy
Shuttle incorrectly threaded.	Thread shuttle as described in paragraph 186.
Bobbin wound too full..	Remove bobbin from shuttle and unwind thread from bobbin until it is down to the level of the rims of the sides of the bobbin.
Rounds of threads on bobbin crossing one another.	Wind bobbin with correct thread tension in order to lay smooth layers of thread in the bobbin.
Shuttle sticky with gummed oil or lint.	Clean shuttle as described in paragraph 207b, and lubricate shuttle as described in paragraphs 204 and 205.
Bobbin tension too tight.	Adjust tension screw on shuttle as described in paragraph 193. <i>Note.</i> Since this is the least likely cause of bobbin thread breakage, the adjustment should be made only as a last resort.
Defective thread	Use smooth, dry, evenly twisted thread.

213. Skipping of Stitch

The principal cause for skipped stitches is that the needle thread fails to catch the bobbin thread because the needle is out of time with the shuttle. The remedy is to adjust the timing as described in paragraph 225.

214. Drawing of Seam

Drawing of the seam occurs when the tension of the needle thread and bobbin thread is too tight. The remedy is to adjust the tensions as described in paragraphs 192 and 193.

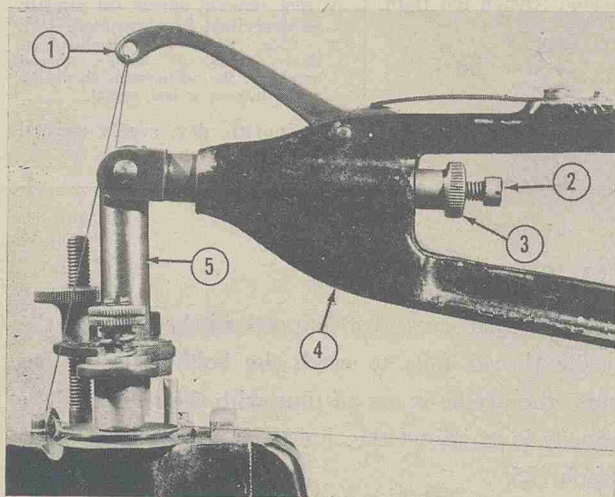
Section XIII. SECOND ECHELON MAINTENANCE

215. General

The second echelon maintenance services covered in paragraphs 216 through 225 will be performed by a qualified mechanic of the using organization.

216. Adjustment of Take-Up Lever Movement (fig. 198)

The travel of the take-up lever (1, fig. 198) is set at the factory for average operating conditions. If this adjustment is disturbed, the correct amount of travel can be obtained by adjusting the thread take-up adjusting screw (2). Turn top of balance wheel forward until needle bar is at its highest position. Loosen the take-up adjusting screw nut (3). To increase the amount of travel of the take-up lever, turn the adjusting screw to the left. To decrease the amount of travel of the take-up lever, turn the adjusting screw to the right. When the desired amount of travel has been obtained, hold the adjusting screw and tighten the adjusting screw nut. If the amount of travel is set to provide sufficient take-up action for the average weight of the threads and materials to be handled, heavier and lighter work can be accommodated by adjusting the tension on the take-up spring. Adjustment of the take-up spring is described in paragraph 194.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	8659	Check lever (take-up lever).
2	SS337F	Check lever thread take-up adjusting screw.
3	NN106J	Check lever thread take-up adjusting screw nut.
4	82220	Needle bar driving lever.
5	82030	Needle bar.

Figure 198. Adjustment of take-up lever movement.

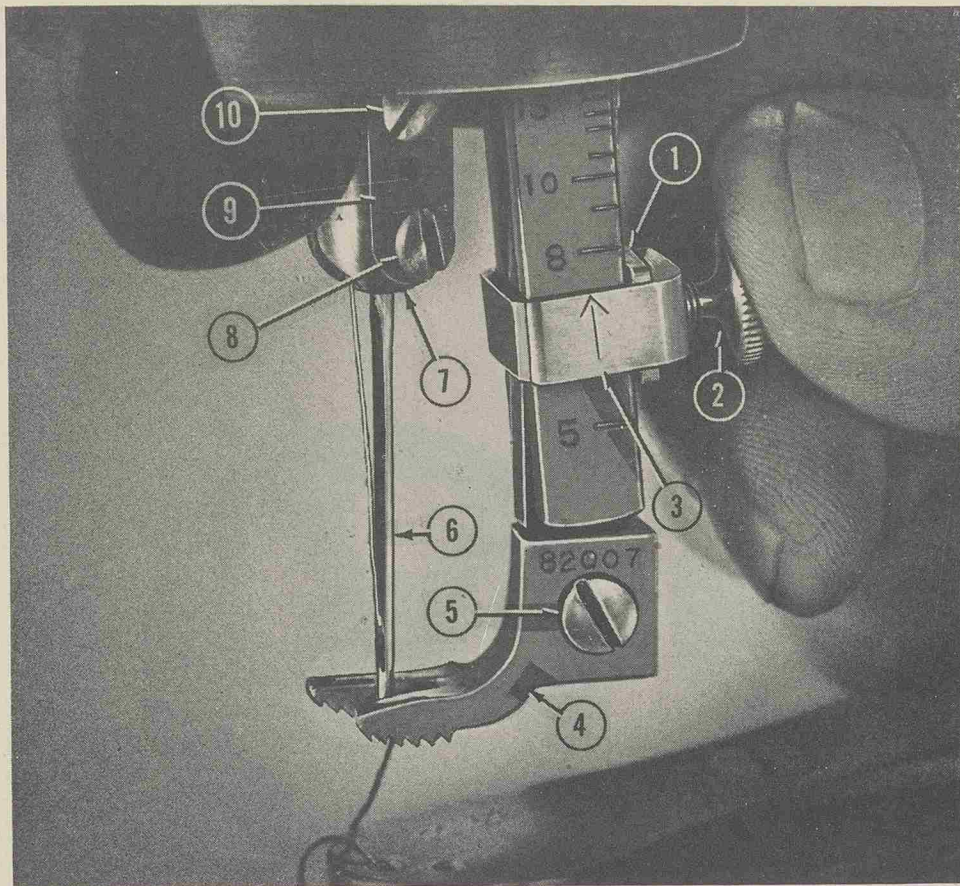
Section XIV. NEEDLE AND FOOT ASSEMBLY

217. Disassembly (fig. 199)

- Loosen the needle bar clamping screw (8, fig. 199) and remove the needle (6).
- Remove the needle bar clamping screw (8).
- Remove the needle bar clamp screw (10) and remove the needle bar clamp (9).
- Remove the feeding foot screw (5).
- Remove the feeding foot (4).
- Loosen the stitch regulator thumbscrew (2).
- Slide the stitch regulator (3) with the stitch regulator gib (1) and thumbscrew down off the end of the foot bar.

218. Assembly (fig. 199)

- Place the stitch regulator (3, fig. 199) on the foot bar so that the stitch regulator thumbscrew (2) is at the rear of the machine. Place the stitch regulator gib (1) against the end of the stitch regulator thumbscrew, so that the end of the foot bar may pass between the gib and the forward side of the stitch regulator.
- Slide the stitch regulator onto the end of the foot bar.
- Adjust the stitch regulator on the foot bar so that the arrow on the stitch regulator points to the number on the foot bar corresponding to the number of stitches per inch that the operator desires to make.
- Tighten the stitch regulator thumbscrew at that point.
- Place the needle bar clamp (9) in position on the bottom end of the needle bar (7), with the round end of the needle bar clamp pointing downward.
- Place the needle bar clamp screw (10) in the top hole of the needle bar clamp and tighten the clamp screw enough to hold the clamp in position.
- Turn the top of the balance wheel forward until the needle bar is at its highest position.
- Place the needle bar needle clamping screw (8) in the bottom hole in the needle bar clamp, and tighten the screw just enough to hold it in position.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	8616	Stitch regulator gib.
2	291W	Stitch regulator thumbscrew.
3	82188	Stitch regulator.
4	82007	Feeding foot.
5	193F	Feeding foot screw.
6	.....	Needle.
7	82030	Needle bar.
8	237F	Needle bar needle clamping screw.
9	81858	Needle bar clamp.
10	SS50F	Needle bar clamp screw.

Figure 199. Needle and foot assembly.

i. Insert the shank of the needle up into the needle bar clamp as far as it will go. The long groove of the needle should be to the left, and the eye of the needle should be directly in line with the arm of the machine.

j. Tighten the needle bar needle clamping screw (8).

k. Move the needle bar clamp to the right or left until the needle will pass through the center of the hole in the needle plate when the needle bar is lowered.

l. Tighten the needle bar clamp screw (10).

Section XV. BALANCE WHEEL AND PULLEY ASSEMBLY

219. Disassembly (fig. 200)

a. Remove belt from needle bar cam and pulley wheel. (See 1, fig. 200.)

b. Remove the balance wheel retaining screw (5).

c. Remove balance wheel (4) from shaft.

d. Loosen the two setscrews in the balance wheel stop motion flanged bushing (3), and remove the

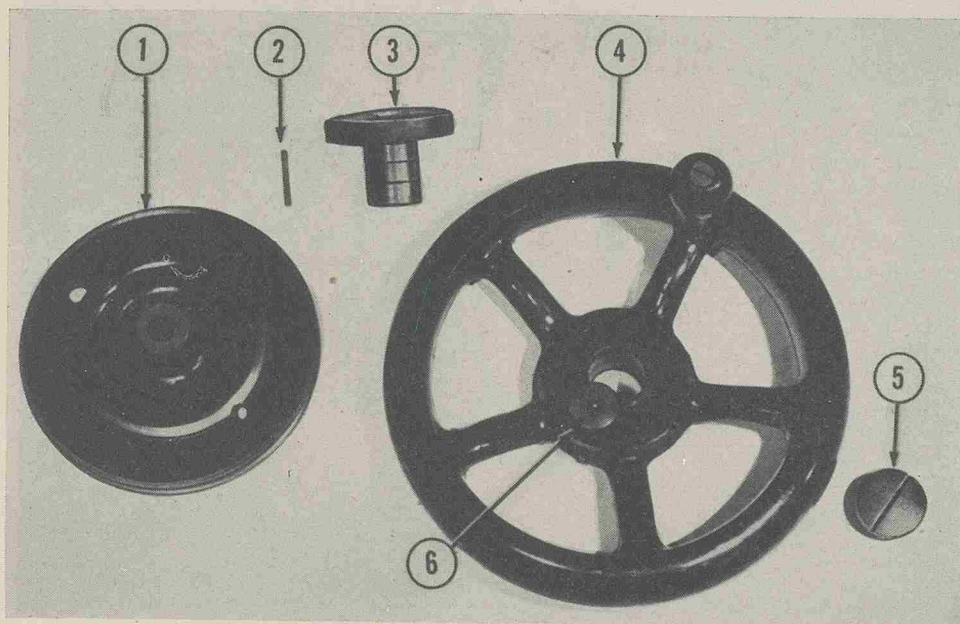
bushing from the shaft.

e. The needle bar cam and pulley wheel (1) is secured to the shaft by a setscrew and the needle bar cam and pulley wheel pin (2). One end of the pin is larger than the other. The pin passes through the hub of the pulley wheel and through the shaft. Place a punch on the small end of the pin as it

emerges from the hub of the pulley wheel. Drive the pin out of the pulley-wheel hub and through the shaft with a hammer.

f. Loosen the setscrew in the hub of the pulley wheel.

g. Remove the pulley wheel from the shaft.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	8661	Needle bar cam and pulley wheel.
2	3012	Needle bar cam and pulley wheel pin.
3	82160	Balance wheel stop motion flanged bushing.
4	82159	Balance wheel.
5	SS569C	Balance wheel retaining screw.
6	NN98R	Balance wheel stop motion plunger thumb nut.

Figure 200. Balance wheel and pulley assembly.

220. Assembly (fig. 200)

a. Place the needle bar cam and pulley wheel (1, fig. 200) on the shaft.

b. Adjust the pulley wheel on the shaft so that the holes in the hub of the pulley wheel are in line with the hole drilled in the shaft for the pulley wheel pin (2).

c. Place the small end of the pulley wheel pin in the larger of the two holes in the pulley wheel hub.

d. Drive the pulley wheel pin through the hub of the pulley wheel until each end of the pin is flush with the outside of the hub.

e. Tighten the setscrew in the hub of the pulley wheel.

f. Place the balance wheel stop motion flanged bushing (3) on the shaft, large end first.

g. Position the flanged bushing on the shaft so that the two setscrews in the bushing will set on the two splines machined in the shaft. Tighten the setscrews.

h. Place the balance wheel (4) on the shaft, with the handle of the wheel to the outside.

i. Secure the balance wheel to the shaft by putting the balance wheel retaining screw in place and

tightening the screw securely.

j. Place the belt on the desired pulley of the needle bar cam and pulley wheel (1).

Section XVI. SHUTTLE-DRIVING GEAR BOX (RACK BOX) ASSEMBLY

221. Removal (fig. 201)

a. Remove the machine head from the stand by removing the screw at each of the four corners of the base of the machine head.

b. Tip the machine head up into a vertical position. (See fig. 201.)

c. Turn the balance wheel until the connecting rod hinge screw (5) comes into position opposite the hole in the lower arm (6).

d. Insert a screw driver through the hole and remove the screw.

e. Loosen the two shuttle-driving gear box screws (7) by giving them a half turn to the left with a screw driver.

f. Use a 3/16-inch punch and a hammer to drive out the shuttle-driving gear box position pin (2).

g. Remove the two shuttle-driving gear box screws (7).

h. Set the machine head down on its stand.

i. Remove the shuttle-driving gear box by pulling it away from the lower arm of the machine in a horizontal direction.

Caution: Do not raise the front of the gear box, for this may damage the end of the long rack (3).

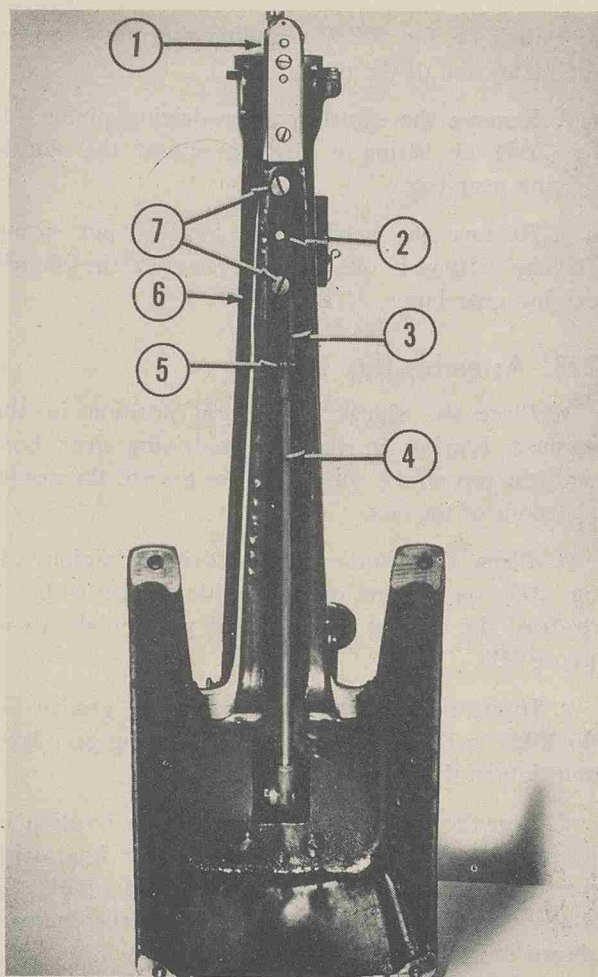
222. Disassembly

a. Remove the two pinion cover plate screws. (See 2, fig. 202.)

b. Remove the pinion cover plate (3).

c. Remove the short rack (7, fig. 203) by grasping each end of it with the fingernails or with the blade of a screw driver, and lifting it out of the rack box.

d. To remove the shuttle carrier, remove the small setscrew in the shuttle carrier pinion by insert-



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	82182	Shuttle-driving gear box.
2	11661	Shuttle-driving gear box position pin.
3	82175	Rack (long).
4	82185	Shuttle-driving lever connecting rod.
5	89E	Shuttle-driving lever connecting rod hinge screw.
6	.....	Hole in lower arm.
7	146J	Shuttle-driving gear box screws.

Figure 201. Removal of shuttle-driving gear box—bottom view of machine head.

ing a small screw driver through the groove (1, fig. 202) at the side of the shuttle-driving gear box. The shuttle carrier can then be pressed through the pinion.

e. To remove the long rack (4), insert a screw driver through the hole (6, fig. 201) and remove the shuttle-driving lever connecting rod hinge screw (5). Then remove the shuttle carrier following pinion (3, fig. 203) by lifting it out of the shuttle-driving gear box. Continue with the removal of the

long rack (4, fig. 202)by pulling it straight toward the pulley end of the machine.

f. Remove the shuttle carrier driving pinion (1, fig. 203) by lifting it straight out of the shuttle driving gear box.

g. Remove the needle plate locating pin spring (6) by lifting it out of its recess in the shuttle driving gear box.

223. Assembly (fig. 203)

a. Place the shuttle carrier in position in the topmost bearing in the shuttle-driving gear box, with the top of the shuttle carrier toward the needle plate side of the box.

b. Place the shuttle carrier driving pinion (1, fig. 203) on the end of the shuttle carrier with the teeth of the driving pinion in the position shown in figure 203.

c. Insert a small screw driver into the groove (1, fig. 202) in the side of the shuttle driving gear box, and tighten the setscrew.

d. Lay the long rack (2, fig. 203) in position in its raceway in the shuttle-driving gear box, with the topmost tooth of the rack meshing with the shuttle carrier driving pinion (1) in the manner shown in figure 203.

e. Place the short rack (7) in position in its raceway in the shuttle-driving gear box so that the top tooth of the rack meshes with the shuttle carrier driving pinion (1) in the manner shown in figure 203.

f. Place the shuttle carrier following pinion (3) in position as shown in figure 203.

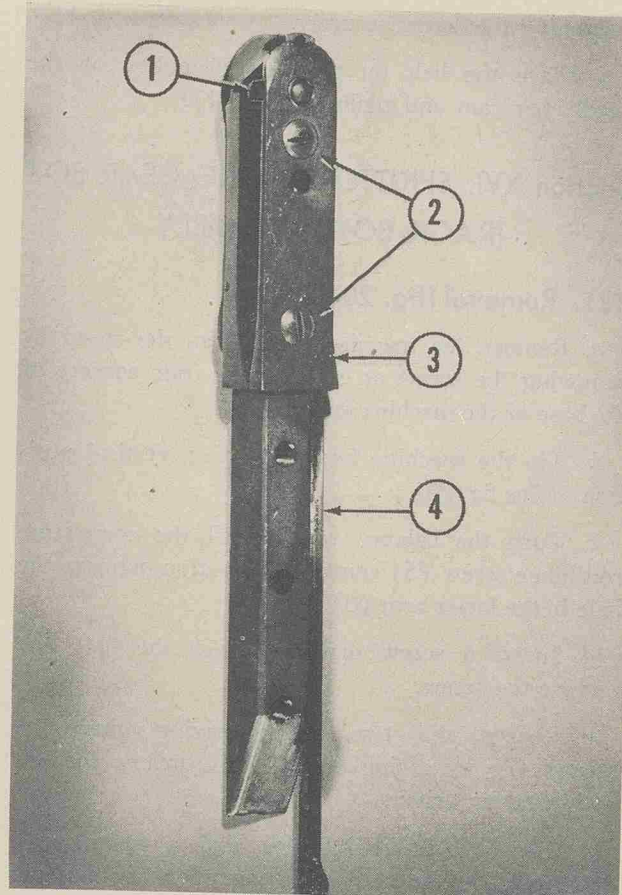
g. Place the needle plate locating pin spring (6) in position as shown in figure 203.

h. Place the pinion cover plate (4) in position on the gear box, with the round end of the cover plate at the end of the gear box.

i. Press down on the cover plate to hold it against the pressure of the locating pin spring. Place the two pinion cover plate screws (5) in position as shown in figure 203, and secure the cover plate by tightening the screws.

224. Installation (fig. 201)

a. Hold the shuttle-driving gear box in a hori-



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	.....	Groove at side of gear box.
2	1423J	Pinion cover plate screws.
3	82174	Pinion cover plate.
4	82175	Rack (long).

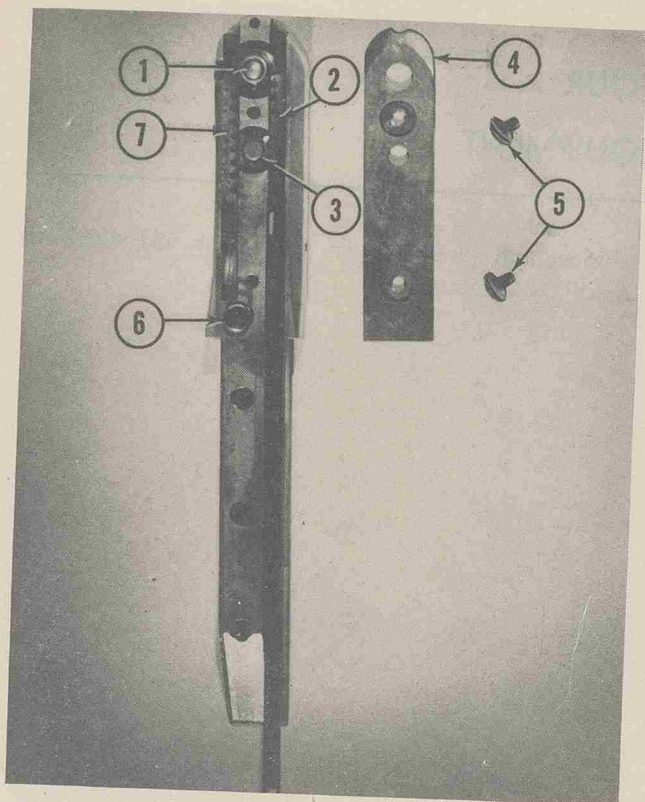
Figure 202. Shuttle-driving gear box—assembled.

zontal position, with the needle plate side up and parallel with the lower arm of the machine head.

b. Start the projecting end of the long rack (3, fig. 201) into the recess in the end of the lower arm of the machine head. Continue to guide the gear box into the recess in the lower arm.

Caution: Be careful not to raise the round (or horn) end of the gear box higher than the arm of the machine head. Press the gear box into place until the horn of the gear box is snug against the end of the arm of the machine head.

c. Place the two shuttle-driving gear screws (7) in position as shown in figure 201, and tighten them just enough to hold the gear box in its proper position.



Ref. No.	Vendor's part No.	Vendor's nomenclature
1	82178	Shuttle carrier driving pinion.
2	82175	Rack (long).
3	82180	Shuttle carrier following pinion.
4	82174	Pinion cover plate.
5	1423J	Pinion cover plate screws.
6	82172	Needle plate locating pin spring.
7	82176	Rack short.

Figure 203. Shuttle-driving gear box—disassembled.

d. Place the shuttle-driving gear box position pin (2) in place as shown in figure 201. Use a 3/16-inch punch and a hammer to drive it into position

until the ends of the pin are flush with the top and bottom of the lower arm of the machine head.

e. Tighten the two shuttle-driving gear box screws (7).

f. Using the fingers, place the shuttle-driving lever connecting rod hinge screw (5) into the bearing end of the long rack (3), thus connecting the long rack with the shuttle-driving lever connecting rod (4). Do not tighten the screw until ready to time the shuttle as described in paragraph 225.

g. Lower the machine head from the vertical to the normal, horizontal position on the stand.

h. Place the four corners of the base of the machine head in position over the four holes in the table of the stand. To secure the machine head to the stand, place a machine screw in each of the four holes and tighten them until the head is secure.

225. Timing Shuttle (fig. 201)

a. The head of the shuttle-driving lever connecting rod hinge screw (5, fig. 201) is marked with a small cut. The end of the shuttle-driving lever connecting rod (4) is marked with a line. These two marks should approximately coincide when the balance wheel is turned, so that the screw head is opposite the hole (6) in the lower arm.

b. To time the shuttle, insert a screw driver through the hole (6) and turn the screw until the shuttle carrier reaches the desired position. When the balance wheel is turned, the leading edge of the shuttle carrier should move at each oscillation to a position approximately one-third of the distance across the needle slot.

PART FOUR

AUXILIARY EQUIPMENT

(The components of the patching machines described in this book are integral parts of the machine.)

chines and are neither used nor classified as auxiliary equipment.)

PART FIVE

REPAIR INSTRUCTIONS

Section XVII. HEAD ASSEMBLY

226. Description

The head assembly (fig. 204) is a compact unit attached to the upper arm of the machine. In the head the motion of a number of small parts is coordinated to control the stitching action of the needle, the needle thread, and the feeding foot. In assembling the head, it is important that the mechanic carefully adjust each part to conform to the operation of the assembly.

227. Removal

a. Four head binding screws hold the head to the upper arm. Loosen them to the point where they just hold the head in place on the arm.

b. Use a punch and a hammer to remove the needle bar piston joint pin which connects the needle bar (20, fig. 203) with the needle bar driving lever. When the joint pin loosens, hold the bottom of the needle bar so that it will not fall out of the head, and remove the joint pin.

c. With one hand, hold the head and the needle bar. With the other hand remove the four head binding screws which have already been loosened.

228. Disassembly (fig. 203)

a. PROCEDURE. (1) Slide the needle bar (20, fig. 203) out of the head assembly.

(2) Remove the two head revolving bush handle retaining screws holding the head revolving bush handle (2) to the head revolving bush (15).

(3) Remove the feed motion bell crank lever joint screw which is on the right-hand side of the head revolving bush handle (2). This releases the bush handle from the head.

(4) Remove the feed motion ring slide bar (14) by pulling it down and off the head revolving bush (15).

(5) At the top of the head, turn the vibrating presser spring bar adjusting nut (24) off the vibrating presser spring bar (21).

(6) Remove the vibrating presser spring bar (21) from the head.

(7) Remove the vibrating presser spring (22) from the head.

(8) Turn the foot bar revolving joint slide rod upper lock nut (6) off the foot bar revolving joint slide rod (8).

(9) Turn the tension (top) adjusting thumb nut off the top of the tension adjusting stud.

(10) Lift the tension (top) spring off the adjusting stud.

(11) Lift the tension (top) cup off the adjusting stud.

(12) Lift the foot bar revolving joint bearing (23) off the top of the head.

(13) Remove the tension (top) disk from the tension adjusting stud.

(14) Detach the lifter hinge screw (9) from the lifter (10) and the vibrating presser lifting lever shaft adjusting lever (13), and remove lifter.

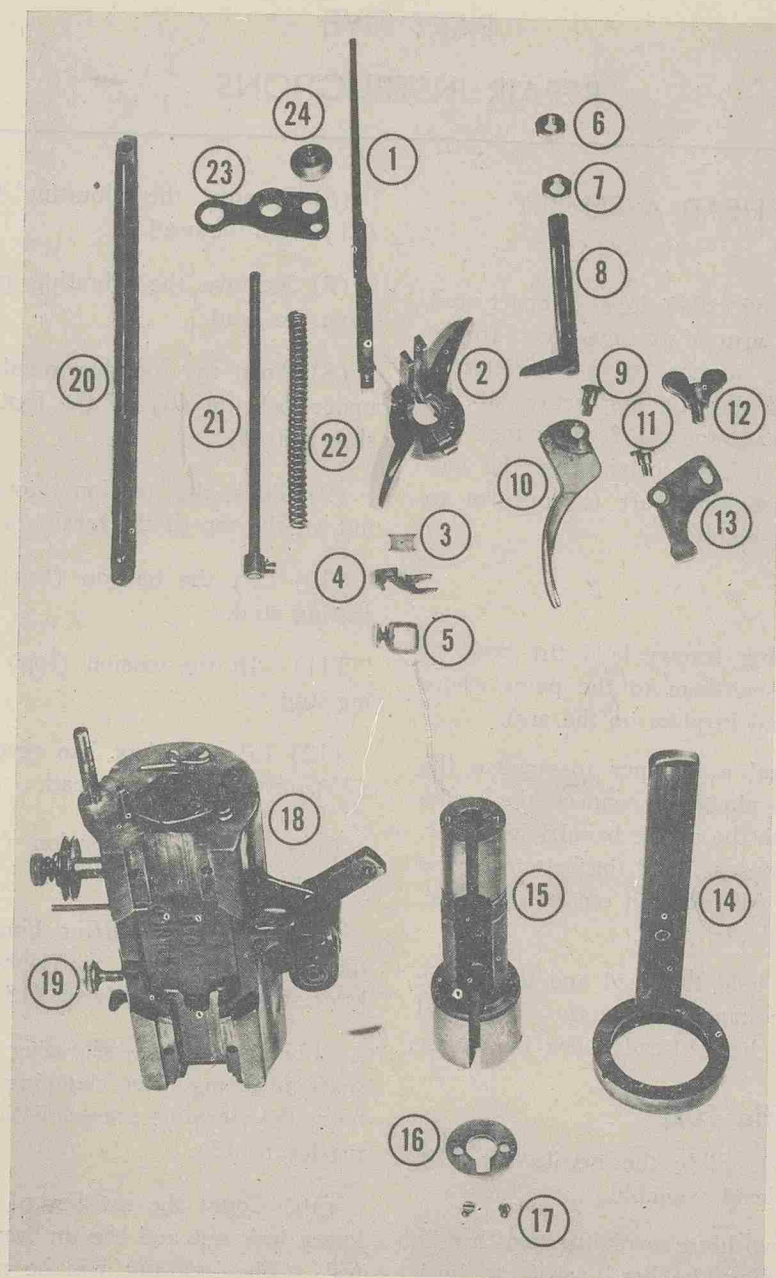
(15) Remove the vibrating presser lifting lever shaft adjusting lever clamping screw (12) and remove the vibrating presser lifting lever shaft adjusting lever (13).

(16) Count the number of threads between the lower lock nut and the unthreaded portion of slide rod. (The lock nut will be replaced in this position.) Remove the foot bar revolving joint slide rod lower lock nut (7) from the foot bar revolving joint slide rod (8).

(17) Remove the foot bar revolving joint slide rod.

(18) Remove the foot bar (1). Remove the feeding foot (4) and the stitch regulator (5) attached to the foot bar as shown in paragraph 217.

(19) Remove the head revolving bush supporting washer screws (17) at the top of the head.



Ref. No.	Vendor's part No.	Vendor's nomenclature	Ref. No.	Vendor's part No.	Vendor's nomenclature
1	8675	Foot bar.	13	82155	Vibrating presser lifting lever shaft adjusting lever.
2	82123	Head revolving bush handle (revolving wing).	14	82053	Feed motion ring slide bar.
3	8616	Stitch regulator gib.	15	8573	Head revolving bush.
4	82007	Feeding foot.	16	8577	Head revolving bush supporting washer.
5	82188	Stitch regulator.	17	211D	Head revolving bush supporting washer screws.
6	NN101J	Foot bar revolving joint slide rod lock nut (upper).	18	82058	Head of machine.
7	NN96J	Foot bar revolving joint slide rod lock nut (lower).	19	SS535W	Head revolving bush stop thumb screw.
8	82056	Foot bar revolving joint slide rod.	20	82030	Needle bar.
9	66F	Lifter hinge screw.	21	82130	Vibrating presser spring bar.
10	82059	Lifter.	22	82129	Vibrating presser spring.
11	648J	Vibrating presser lifting lever shaft adjusting lever hinge screw.	23	82055	Foot bar revolving joint bearing.
12	515J	Vibrating presser lifting lever shaft adjusting lever clamping screw.	24	NN88W	Vibrating presser spring bar adjusting nut.

Figure 204. Head assembly.

(20) Lift the head revolving bush supporting washer (16) off the top of the head.

(21) Slide the head revolving bush (15) down and out of the head.

b. If the needle bar is not to be replaced it may be left secured to the needle bar driving lever. In this case, when the head is removed, pull the head down and away from the needle bar, leaving the needle bar attached to the needle bar driving lever.

229. Assembly (fig. 203)

a. PROCEDURE. (1) Slide the top of the head revolving bush (15) into the head (18) until the top of the revolving bush is flush with the recess in the top of the head.

(2) Place the head revolving bush supporting washer (16) over the top of the revolving bush and on the top of the head.

(3) Place the head revolving bush supporting washer screws (17) in the supporting washer and tighten the screws securely.

(4) Attach the stitch regulator (5) and the feeding foot (4) to the foot bar (1) as described in paragraph 218.

(5) Place the small end of the foot bar (1) into its recess in the bottom of the head (18) and push the foot bar up through the head with the smooth side of the foot bar to the rear of the head.

(6) Place the foot bar revolving joint slide rod (8) in position in the rear right side of the head, with the top of the slide rod projecting through the top of the head.

(7) Place the foot bar revolving joint slide rod lower lock nut (7) on the foot bar revolving joint slide rod (8) and turn the lock nut down to the point indicated in paragraph 228a(16).

(8) Place the vibrating presser lifting lever shaft adjusting lever (13) in position on the arm of the vibrating presser lifting lever shaft, and secure the adjusting lever to the arm of the shaft with adjusting lever clamping screw (12).

(9) Place the lifter (10) in position on the vibrating presser lifting lever shaft adjusting lever (13) and secure the lifter to the adjusting lever with lifter hinge screw (9).

(10) Place the tension (top) disk on the tension adjusting stud.

(11) Place the foot bar revolving joint bearing (23) in position on the top of the head so that it fits on the tension adjusting stud and on the top of the foot bar revolving joint slide rod (8).

(12) Place the tension (top) cup on the tension adjusting stud, and slide the cup down on the stud until the cup fits between the foot bar revolving joint bearing (23) and the stud.

(13) Place the tension (top) spring on the tension adjusting stud.

(14) Place the tension (top) adjusting thumb nut on the tension adjusting stud and turn the thumbscrew down until it compresses the tension spring.

(15) Place the foot bar revolving joint slide rod upper lock nut (6) on the top of the foot bar revolving joint slide rod (8), and turn the lock nut down on the slide rod until the nut is secure against the foot bar revolving joint bearing (23).

(16) Place the vibrating presser spring (22) in position in its recess in the right rear of the head.

(17) Place the vibrating presser spring bar (21) in position in the right rear side of the head, threading the end of the bar through the presser spring (22).

(18) Place the vibrating presser spring bar adjusting nut (24) on the vibrating presser spring bar (21) and turn the nut down to foot bar revolving joint bearing (23).

(19) Place the feed motion ring slide bar (14) in position on the head by sliding the bar of the slide bar up into its recess in the right side of the head and placing the ring of the slide bar around the bottom of the head revolving bush (15).

(20) Place the head revolving bush handle (2) on the bottom of the head revolving bush (15). Secure the bush handle to the bush with the two head revolving bush handle retaining screws. Turn the screws into position, but do not tighten them.

(21) Place the feed motion bell crank lever joint screw in the hole in the right-hand side of the head revolving bush handle (2) and tighten the screw.

(22) Tighten the two head revolving bush handle retaining screws.

(23) Slide the top end of the needle bar (20) into the recess for the needle bar at the bottom of the head. Slide the needle bar up through the head until the top of the needle bar projects through the top of the head.

b. ADJUSTMENT. Small adjustments of the head assembly should not be made until it is installed on the machine.

230. Installation

a. Hold the head and needle bar with one hand and place the head in position against the end of the upper arm. Turn the balance wheel until the feed motion ring slide bar roller on the open side of the

head fits into the cam race in the feed motion cam wheel in the end of the arm. Secure the head to the arm with the four head retaining screws.

b. Lift the top of the needle bar (20) until the hole in the end of the bar coincides with the bearing in the end of the needle bar driving lever.

c. Start the needle bar piston pin through the lever bearing and the needle bar. Then use a punch and a hammer to drive the pin through until the ends of the pin are flush with the outside surfaces of the lever bearing.

d. Tighten the four head retaining screws securely.

e. After the head is installed, test the operation of the machine. Make any adjustments necessary, following the instructions in parts two and three.

BOOK 5

**TRAILER,
TWO-WHEEL,
SHOE REPAIR**

PART ONE

INTRODUCTION

Section I. GENERAL

231. Scope

Book 5 contains information on the two-wheel shoe repair trailer for the guidance of the personnel to whom this equipment is assigned. It covers the operation and maintenance of the trailer which carries the two-wheel trailer shoe repair equipment discussed in preceding books 1 through 4.

232. Records

The following maintenance forms, records, and guides will be used in the performance of prescribed operations:

a. FIRST ECHELON (DRIVER). (1) *War Department Form 48 (Driver's Trip Ticket and P.M. Service Record)*. The reverse side of the form contains the operator's preventive maintenance service reminder schedule.

(2) *Standard Form 26 (Driver's Report—Accident—Motor Transportation)*. This form will be filled out on the spot in case of accident and will be promptly turned in to the proper authority. (See TM 21-305.)

b. SECOND ECHELON (MECHANIC). (1) *WD AGO Form 460*. This form provides the basis for a control system whereby preventive maintenance services may be performed at regular intervals.

(2) *WD AGO Form 461 (Preventive Maintenance Service and Technical Inspection Work Sheet for Wheeled and Half-Track Vehicles)*. This form provides a convenient check list to be used in technical inspections.

(3) *WD AGO Form 478 (MWO and Major Unit Assembly Replacement Record and Organizational Equipment File)*. This form is printed on a jacket which serves as a file for other vehicle records.

(4) *WD AGO Form 9-68 (Spot-Check Inspection Report for Wheeled and Half-Truck Vehicles)*. This form is used by officer personnel in making spot-check inspections.

(5) *WD AGO Form 468*. This form is used to report unsatisfactory equipment to higher authority.

Section II. DESCRIPTION AND DATA

233. Description

a. The two-wheel shoe repair trailer (fig. 205) is designed to carry all the two-wheel trailer shoe repair equipment covered in this manual. In addition, it carries a PE 197 electric generator, driven by a gasoline engine, which furnishes the power to operate the equipment and working lights. The generator is set into an angle iron frame fastened to the deck of the trailer in front of the right wheel housing. Two steel eyes are secured to the bed of the trailer for tying down the generator. They are located on each side of the angle iron frame, on the longitudinal center line of the trailer.

b. The bed of the trailer serves as a work table after the heavy equipment is removed and set up for operation. The front of the left wheel housing (fig. 205) is cut on a 45° angle to provide better working conditions for a single jack operator. A davit base and a housing for the davit are attached to the right wheel housing. Four duplex receptacles are installed on the trailer bed for plugging in the work lights. The trailer has rollers on the bed at the rear which are used to facilitate sliding the stitcher-finisher unit off the rear of the trailer. An eyebolt located in the center of the front cross member is used to anchor the chain employed in unloading equipment from the rear of the trailer. A tool compartment and shoe last carrier is built into the deck of the trailer.

c. A removable rigging box, carrying the patching machine and various miscellaneous articles, such as extra light bulbs, electric cable, and the like, is located at the front end of the trailer bed. Another removable box, located in front of the left wheel housing, is provided for the stitching head. Both boxes are equipped with locks and carrying handles. The covers are hinged and rest on sponge rubber gaskets, making the boxes as nearly dustproof as possible. The patching machine and the stitching head can be fastened in their respective boxes.

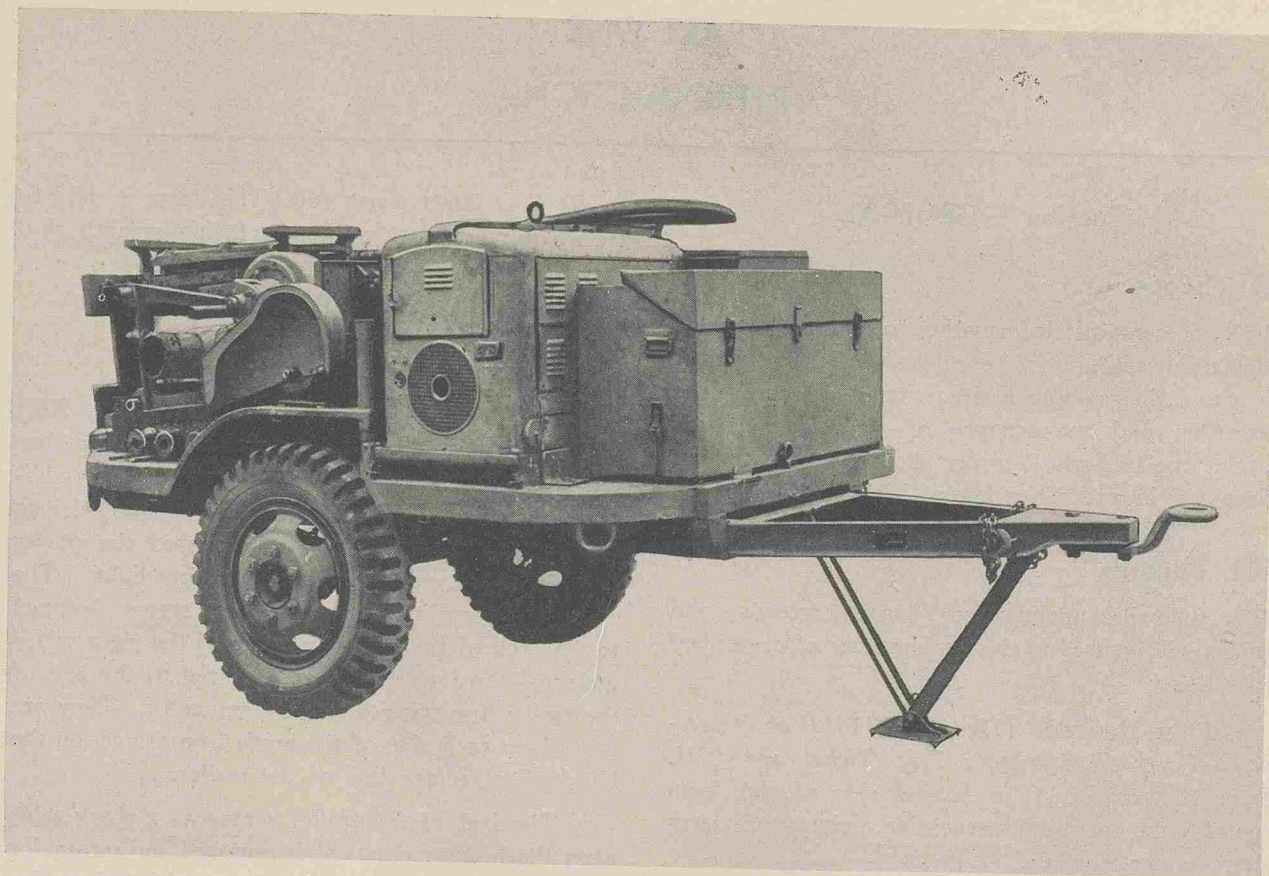


Figure 205. Two-wheel shoe repair trailer.

d. The trailer is a single-axle, two-wheel type, of welded all-steel construction. It is capable, in general, of being towed over all kinds of roads within the safe driving speed of the towing vehicle with a load of approximately 2,950 pounds. The two wheels, of standard design and single-disk, six-stud type, are mounted on tapered roller bearings. The axle is of alloy steel, heat-treated and properly cambered for the service required. Axle stops are provided between the frame and axle to prevent the tires from coming into contact with any part of the trailer. The springs, of the multiple leaf type, are mounted on top of the axle. Provisions are made for easy removal of the wheel, axle, and spring assembly to facilitate shipping the trailer by airplane. When the springs are removed, no projections exist below the bottom of the main frame members.

e. A "V" type drawbar made of 4-inch structural steel is used on the trailer. It may be detached from the trailer frame or slid back into it. A safety chain is welded on each side of the drawbar, at the front of the trailer. They are of suitable length and size

to hold the loaded trailer should the pintle hook become disengaged. The drawbar is equipped with a folding type drawbar support. When not in use, it is folded up into the drawbar and held in place by a snap that fastens through an eye on the support. The lunette eye, of standard ordnance design, and made of forged steel, is adjustable. It can be coupled to any towing vehicle equipped with a standard ordnance pintle hitch.

f. Tubular leveling jacks with screw type shafts, placed at each corner of the trailer, permit accurate adjustment of the legs to insure a level trailer floor. A steel base plate $\frac{3}{16}$ inch thick and 8 inches square, with grab tips, is provided on the bottom of each jack. When not in use, the jacks are carried inside the frame at the corners of the trailer, where they are locked in position, with no portion projecting below the trailer frame.

g. A cast steel pintle hook of standard design, accommodating the eye of the drawbar of a similar trailer, is riveted to the center of the frame at the rear of the trailer.

h. Two combination service and black-out tail-lights and stop lights are installed on the rear end of the trailer. Switches for the lights are operated from the front of the trailer. Three reflectors are placed on the trailer, one on each side and one on the rear.

i. Each trailer is equipped with a davit, a hoisting chain, and a Yale and Towne Pul-Lift hoist, which are used in loading and unloading the shoe repair equipment.

j. A brass name plate is placed on the left side of the front of the trailer next to the letters U.S. stamped into the frame. It carries the following information: nomenclature, stock number, model number, serial number, order number, date of delivery, Technical Manual number, and name of manufacturer.

234. Tabulated Data

- a. Length (less drawbar).....108 inches
- b. Width 67 inches
- c. Height (approximate)60 to 66 inches

- d. Weight, light1,750 pounds
- e. Weight, loaded (approximate)..4,700 pounds
- f. Minimum turning radius.....55 inches
- g. Wheel typeVentilated disk
- h. Wheel size7 by 20 inches
- i. Tire size7.50 by 20 inches
- j. Tire type10 ply
- k. Tire pressure55 pounds
- l. Lunette eye dimensions..3 inches, inside diameter; 6¼ inches, outside diameter; 1⅝ inches thick.

m. Lunette height:

- (1) Lowest positions19½ inches(approx.)
- (2) Intermediate positions.23½ inches(approx.)
31½ inches(approx.)
- (3) Highest positions35½ inches(approx.)

Section III. TOOLS AND ACCESSORIES

235. General

The only tools shipped with the trailer are those furnished with the shoe repair machines it carries.

PART TWO

OPERATING INSTRUCTIONS

Section IV. OPERATION UNDER USUAL CONDITIONS

236. Coupling Trailer to Towing Vehicle

a. Adjust the lunette to the proper height for engagement to the pintle hook on the towing vehicles.

b. Maneuver the towing vehicle so that its pintle is as close to the lunette of the trailer as is practical.

c. Raise the drawbar of the trailer high enough so that the base of the drawbar support clears the ground, thus permitting the drawbar support to be folded into its locked position for towing. To accomplish this proceed as follows:

(1) Tilt the base of the support and allow the support rods to fold up into each other.

(2) Lock the folded support to the drawbar by attaching the snap on the drawbar through the eye on the support rod.

Note. When raising the drawbar of the trailer, the load on the drawbar can be decreased by having one or two men place their weight on the rear of the trailer.

d. Place the lunette eye onto the pintle hook and lock it.

e. Hook the safety chains on the drawbar to the towing vehicle.

f. Insert electric cable plug into receptacle on the towing vehicle and test the operation of the lights.

g. Test the black-out switch.

237. Driving Truck and Trailer

a. In turning corners, be sure to allow for the fact that the trailer's rear wheels turn inside the turning radius of the towing vehicle.

b. In backing, steer the towing vehicle in one direction to make the trailer turn the opposite way.

c. Always have another man watch when you back up. Take particular care to avoid jackknifing.

d. Take corners carefully, since trailers sway at

high speeds. Slow down on rough roads to keep trailer from overturning.

e. Always check coupling before towing trailer.

238. Uncoupling Trailer from Towing Vehicle

a. Remove the electric cable plug from the receptacle on the towing vehicle.

b. Unhook the drawbar safety chains from the towing vehicle.

c. Detach the snap from the eye on the drawbar support.

d. Unlock the pintle hook on towing vehicle.

e. Remove lunette eye from pintle hook, raising drawbar sufficiently to allow the drawbar support to drop into place. Then allow trailer to rest on drawbar support.

239. Unloading Trailer and Setting Up Equipment

a. PRELIMINARY STEPS. When the trailer is in its desired location, removed from the towing vehicle, and with the drawbar support lowered, proceed as follows:

(1) Block wheels carefully so that the trailer will not roll during unloading. This is especially necessary when the trailer is located on uneven or sloping ground.

(2) Unfasten and remove canvas trailer cover.

(3) Let down the four jacks at the corners of the trailer to prevent tipping of the trailer while it is being unloaded. To level trailer adjust the height of the jacks as follows:

(*a*) Remove the cotter pin from the locking pin which secures the jack to the channel on the under side of the chassis.

(*b*) Let the jack swing down into the vertical position and place the locking pin through the hole in the outer and inner sections of the jack. To permit greater adjustment of the jack, there are two

sets of holes in the outer section of the jack which can receive the locking pin.

(c) Lock the jack in the vertical position by means of the bent bar which fits into the hole in the connecting strap attached to the outer section of the jack.

(d) Turn jackscrew to attain proper height adjustment of jack, thus taking some weight off the tires.

b. RIGGING BOX. The first item to be removed is the rigging box (fixture and parts) mounted across the front of the trailer. This box is held in place by two catches on each end. Release the catches and carry box off trailer.

c. GENERATOR. The generator is the second item to be removed from the trailer. It is set into an angle iron frame fastened to the trailer deck in front of the right wheel housing. Two steel eyes are secured to the bed of the trailer, one on each

side of the angle iron frame, on the longitudinal center line of the trailer. The generator is held in the angle iron frame by a turnbuckle equipped cable which is fastened to one steel eye, then brought over the top of the generator and hooked to the other steel eye. To remove generator from trailer (fig. 206) first loosen cable turnbuckle and then unhook chain from eye on bed of trailer. Then proceed as follows:

(1) Attach davit housing to trailer.

(2) Remove davit from top of stitcher-finisher rack and place in davit housing. See that davit rests in a vertical position. If necessary, adjust leveling jacks until davit is vertical, thus assuring easy movement of the davit in its housing.

(3) Attach hook on top of hoist housing through eye in davit. Insert hook at end of hoist chain into ring welded to top of generator housing. To raise or lower generator, follow instructions indicated on arm of Pul-Lift hoist.

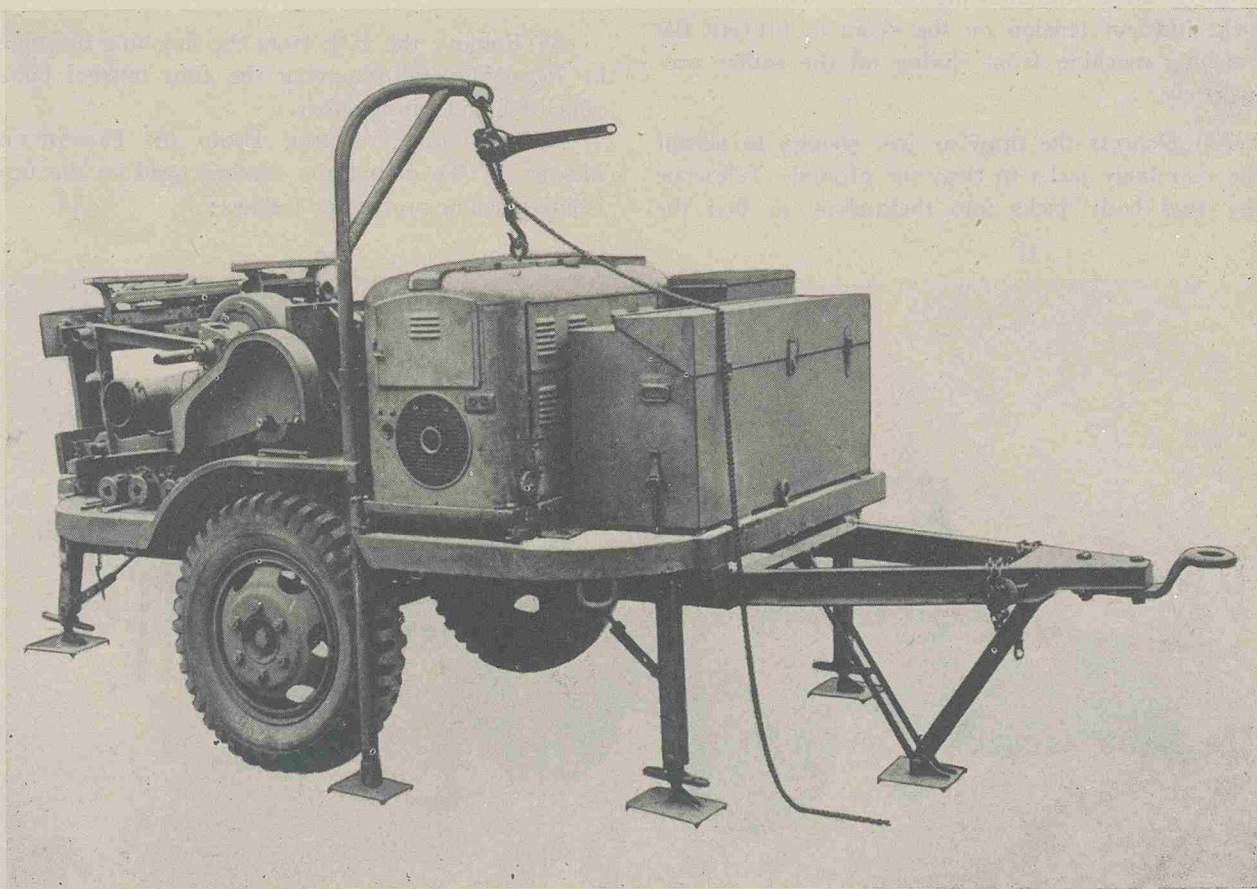


Figure 206. Unloading generator.

(4) Raise generator high enough to clear angle iron frame; slowly swing generator off right edge of trailer by turning davit clockwise in its housing; then lower generator to ground.

(5) See TM 11-940 for instructions on putting generator into operation.

d. **STITCHER-HEAD BOX.** The third item to be removed is the stitcher-head box on the left side of the trailer. This box is held to the trailer by one bolt with a swivel handle, located on the left side of the trailer, and by two angle-irons fitting into the other side of the box. After releasing the swivel bolt and pulling the box several inches away from the two angle-irons, lift the box by means of the handles located on each end and set it on the ground.

e. **FINISHING MACHINE.** (1) To remove the finishing machine (fig. 207), first engage the hook on the Pul-Lift housing to the eyebolt at the front of the trailer, and the hoist chain hook to the eye of the frame of the finishing machine. Establish and lock sufficient tension on the chain to prevent the finishing machine from sliding off the trailer prematurely.

(2) Depress the drawbar just enough to permit the rear body jacks to clear the ground. Telescope the rear body jacks into themselves so that the

locking pins are in the top holes. (See a(3)(b) above.) Then extend the jack braces to the second holes so that the jacks point downward and slightly to the rear. Let the trailer down on the rear jack footplates. (See fig. 207.) With the trailer in this tilted position, the rear leveling jacks, when they bear on the ground, should be as close to vertical as possible. Failure to check this position before the finishing machine is detached from its cradle may result in injury to the rear leveling jacks.

(3) Place the bed of the trailer on a level plane, then loosen and remove the two holding pins and the safety chain from the finishing-machine rack and the cradle.

(4) Tilt the trailer onto the rear jacks and operate the Pul-Lift slowly to allow the finishing machine and frame to slide from the trailer. If the machine does not rest squarely on the ground, adjust rear body jacks to the necessary extent.

(5) Set the finishing machine in its proper location. This can be done by three or four men.

(6) Remove the rack from the finishing machine by loosening and removing the four tension bolts which fasten them together.

f. **MOUNTING STITCHER HEAD ON FINISHING MACHINE.** To mount the stitcher head on the finishing machine proceed as follows:

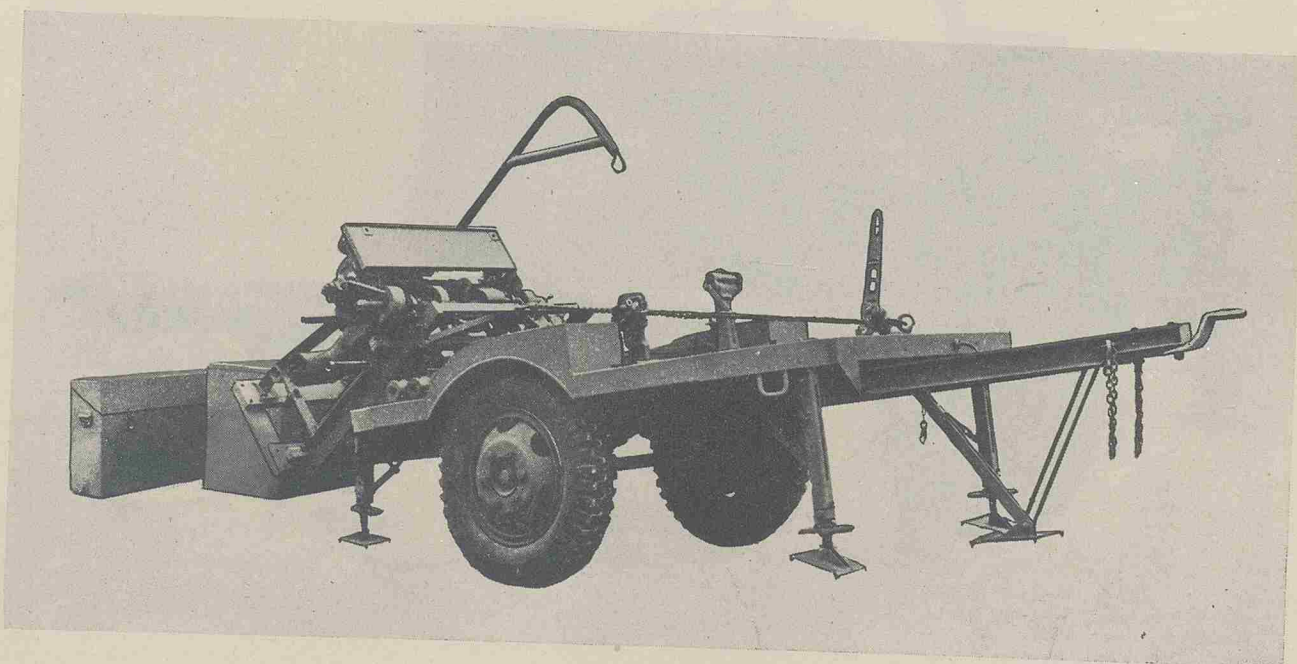


Figure 207. Unloading finishing machine.

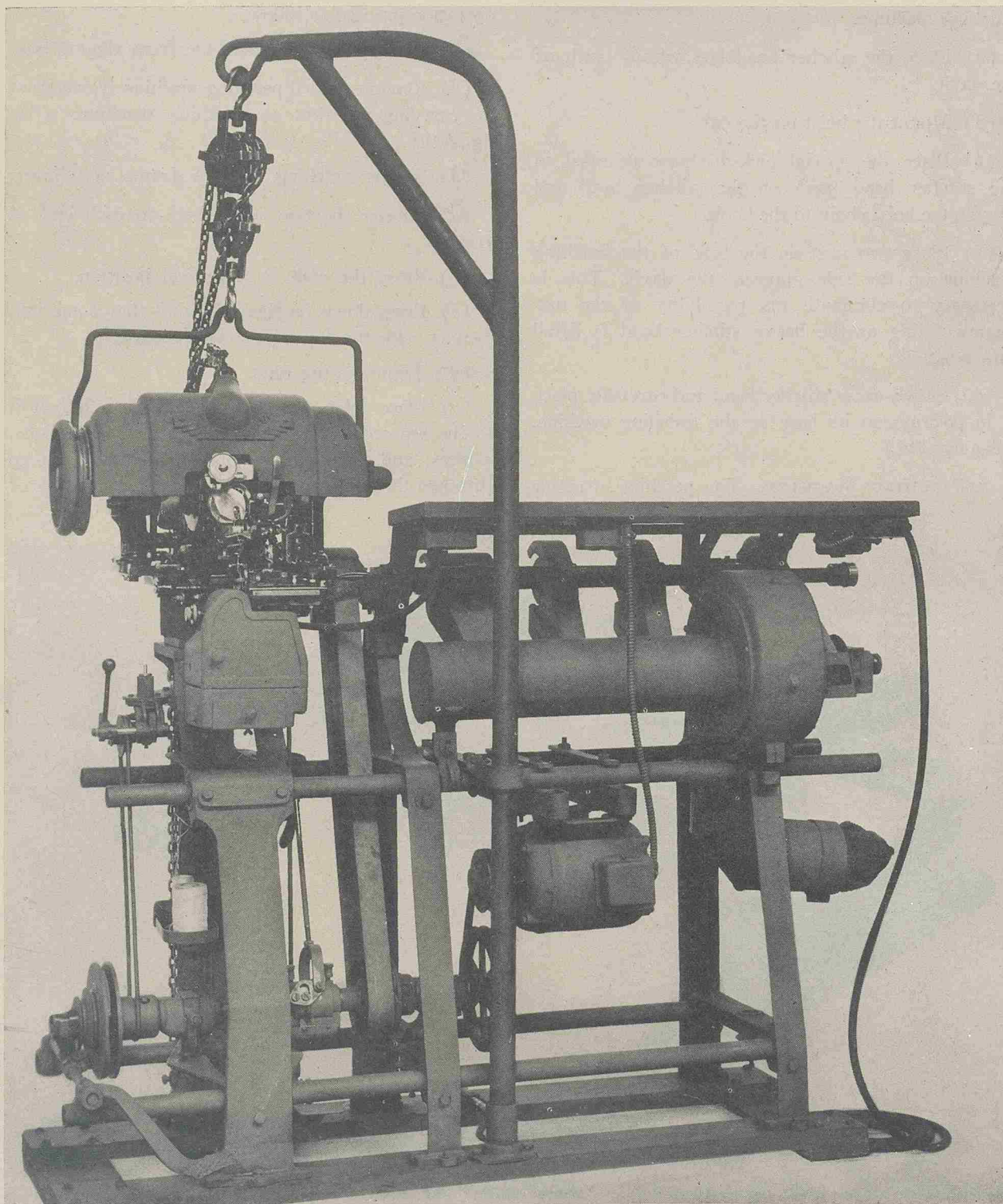


Figure 208. Mounting stitcher head.

(1) Remove the davit from the davit housing on the trailer and place it into the sockets on the finishing machine.

(2) Place the stitcher head box within reach of the davit.

(3) Mount the hoist on the davit.

(4) Place the special pick-up hook (carried in the stitcher head box) on the stitcher head and engage the hoist chain to the hook.

(5) Place two men on the base of the finishing machine on the side opposite the davit. This is necessary to eliminate any possibility of the machine's tilting as the heavy stitcher head is lifted into position.

(6) Slowly raise stitcher head and carefully place it in position on its base on the finishing machine. (See fig. 208.)

g. PATCHING MACHINE. The patching machine

is contained in the rigging box previously removed. (See *b* above.) To assemble patching machine for operation proceed as follows:

(1) Remove patching machine from rigging box.

(2) Remove folded patching machine frame from its carrying position on finishing machine. (See fig. 209.)

(3) Set up patching machine frame as follows:

(a) Loosen the two wing nuts on each end of frame.

(b) Raise the ends to a vertical position.

(c) Press down on the ends until they come into contact with the top of the foot section.

(d) Tighten wing nuts.

(e) Place table top on metal frame and bolt it to the top cross bars, using the four carriage bolts, clamps, and wing nuts supplied. These bolts go through the table top, into the slots in the top of

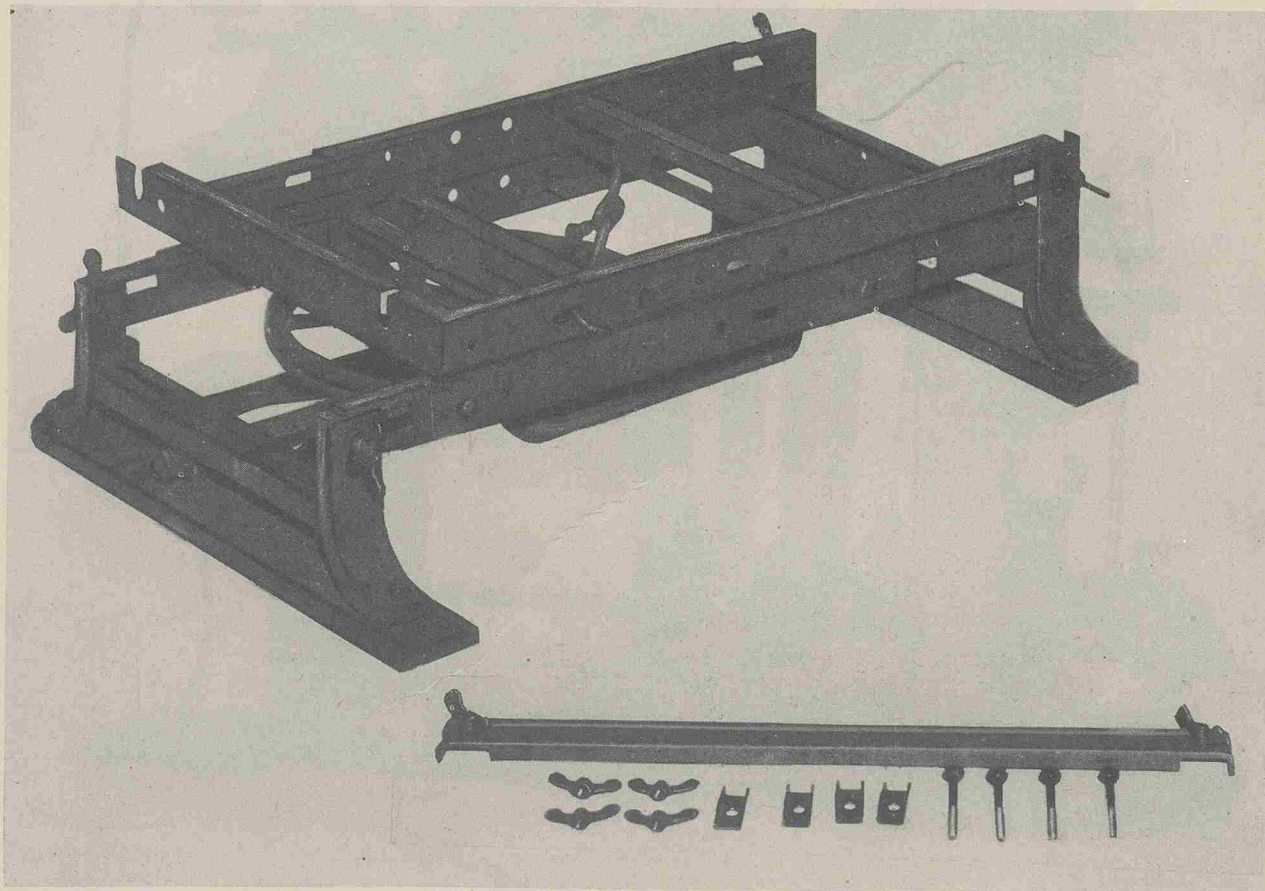


Figure 209. Folded sewing machine frame.

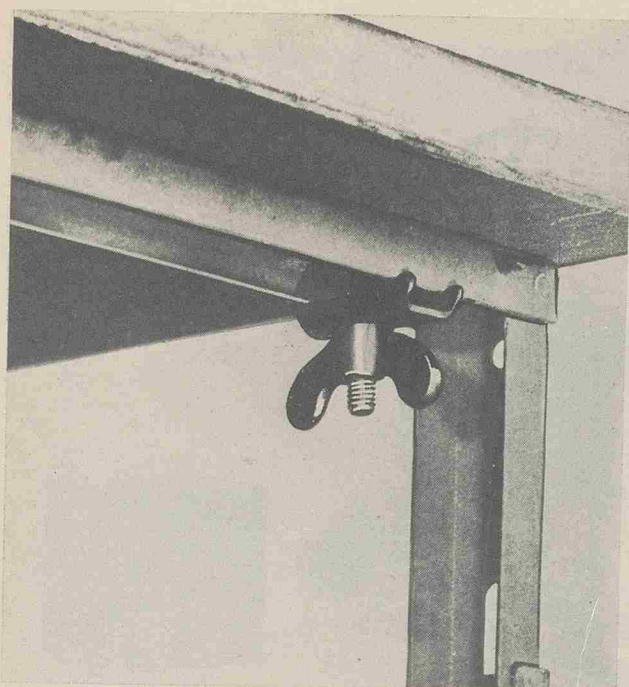


Figure 210. Detailed view of table top mounting.

the steel frame, through the holes in the clamps, and then are fastened with the wing nuts. (See fig. 210.)

(f) Place foot treadle in operating position.

(g) Attach connecting rod (carried on left end of machine frame) to foot treadle and driving wheel.

(h) Attach metal brace to the back of the frame, connecting both ends of frame. Use the two carriage bolts and wing nuts supplied.

(i) Place patching machine on its bed on the table top (or on steel spacer, if it is used).

(j) Attach driving belt to machine.

h. SOLE CUTTER. Place sole cutter in its retainer on the rear of the trailer.

i. SOLE SKIVER. Place the sole skiver in its retainer on the right wheel housing.

j. SHOE JACKS AND LIGHT BRACKETS. Fit shoe jacks and light brackets into their receptacles.

240. Leveling Bed of Trailer

After trailer is unloaded, readjust body jacks to get a level working surface. To level the trailer bed proceed as prescribed in paragraph 239*a*. When the

trailer is located on uneven ground, block its wheels before adjusting the leveling jacks.

241. Dismantling Equipment and Loading Trailer

a. THREADED PARTS. Take care in loading the trailer to line up any screwed connections which are used to anchor the equipment to the deck of the trailer. Do this before the bolts are applied in order to prevent undue wear of the threaded parts.

b. TOOL COMPARTMENT AND SHOE LAST CARRIER. Return to their appropriate boxes all tools, shoe lasts, and other pieces of equipment carried in the tool compartment and shoe last carrier.

c. DISMOUNTING STITCHER HEAD FROM FINISHING MACHINE. To dismount stitcher head from finishing machine (fig. 212) proceed as follows:

(1) Place the davit into the sockets on the finishing machine.

(2) Mount the hoist on the davit.

(3) Place the stitcher-head box within reach of the davit.

(4) Place the special pick-up hook (carried in stitcher-head box) on stitcher head and engage the hoist chain to the pick-up hook.

(5) Assign two men to stand on the base of the finishing machine on the side opposite the davit. This eliminates any possibility of the machine's tilting as the heavy stitcher head is lowered into its box.

(6) Slowly lower stitcher head and carefully place it in position in the box. Adjust hinged holding brackets.

d. FINISHING MACHINE. By moving the finishing machine or the trailer, whichever is more practicable, bring them within loading distance of each other. Maneuver the equipment so that the back of the finishing machine rack is lined up with the channel of the cradle. Then proceed as follows:

(1) Prepare the trailer as described in paragraph 239*e*(2) for receiving the finishing machine.

(2) Engage the hook on the Pul-Lift housing to the eyebolt at the front of the trailer, and the hoist chain hook to the eye of the frame of the finishing machine.

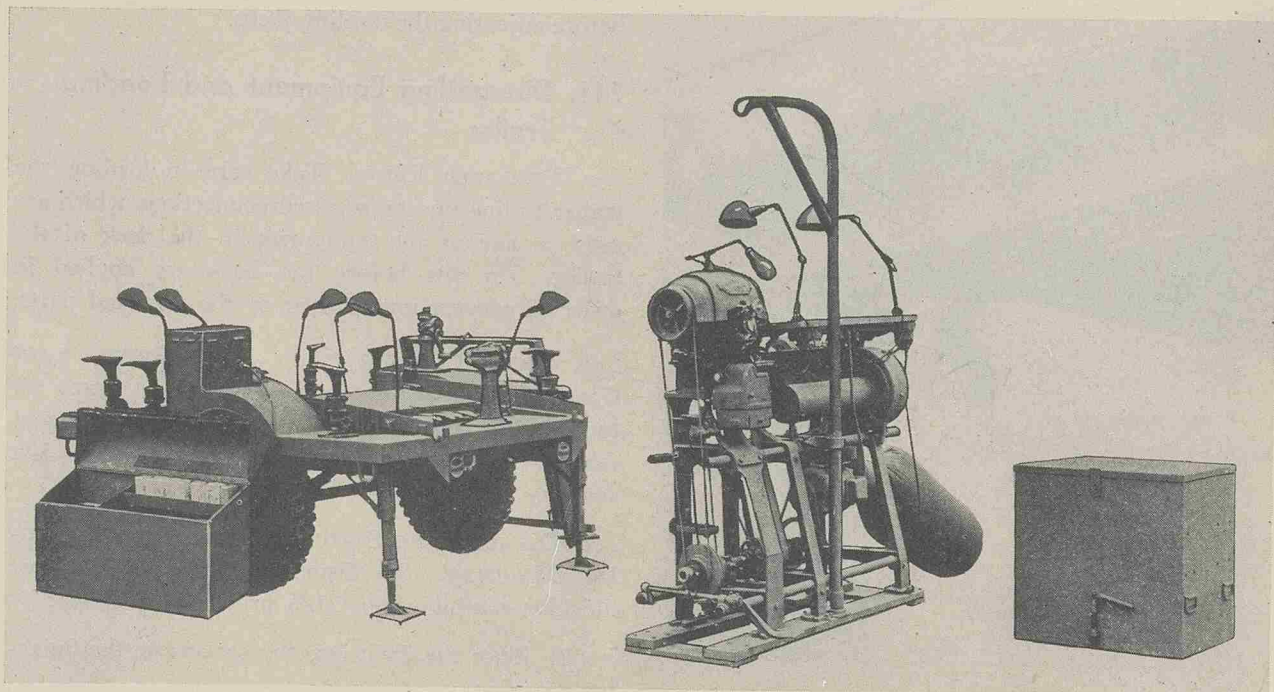


Figure 211. Equipment set up for operation.

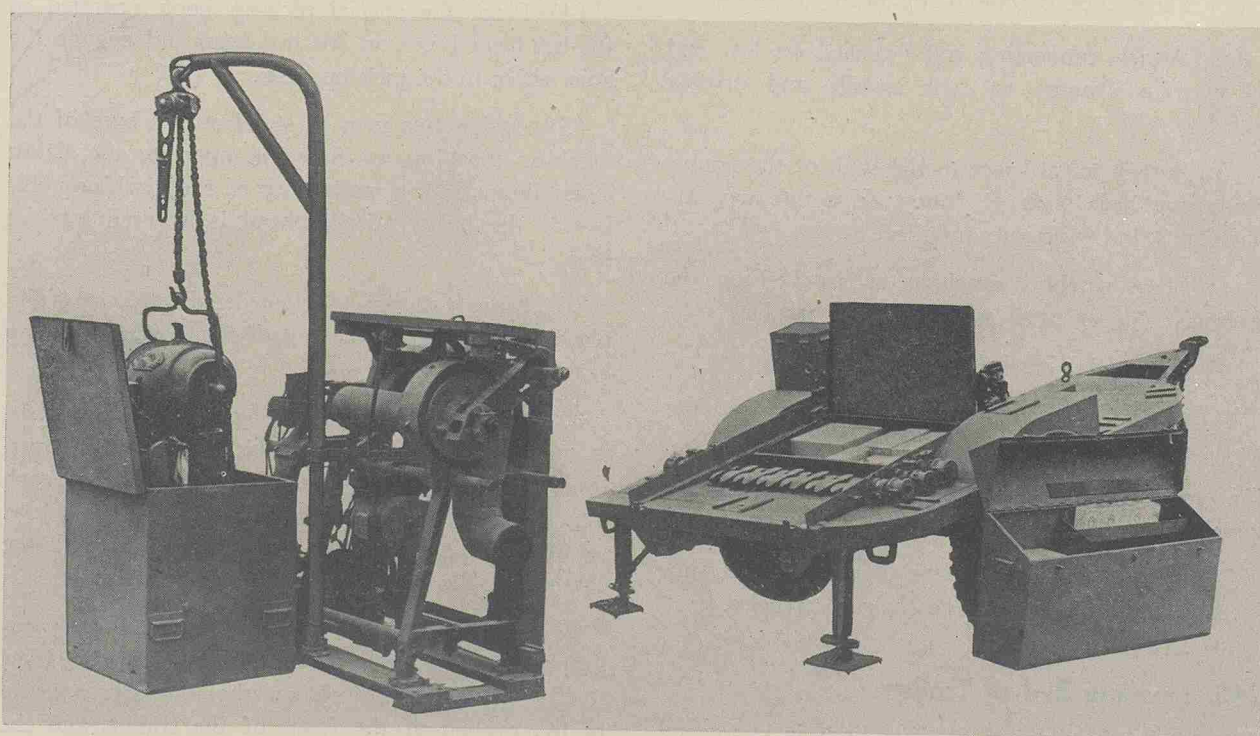


Figure 212. Removal of stitcher head.

(3) Attach the rack to the finishing machine, using the four tension bolts that are supplied.

(4) With the sides of the finishing machine rack touching the rollers on the rear edge of the trailer, operate the hoist carefully to raise the finishing machine into position in the cradle.

(5) Attach the safety chain to the eye on top of the finishing machine rack. Then attach the two holding pins through the cradle and the rack. (See fig. 213.) Be sure to place a cotter pin through the two holding pins to prevent their becoming disengaged when trailer is in motion.

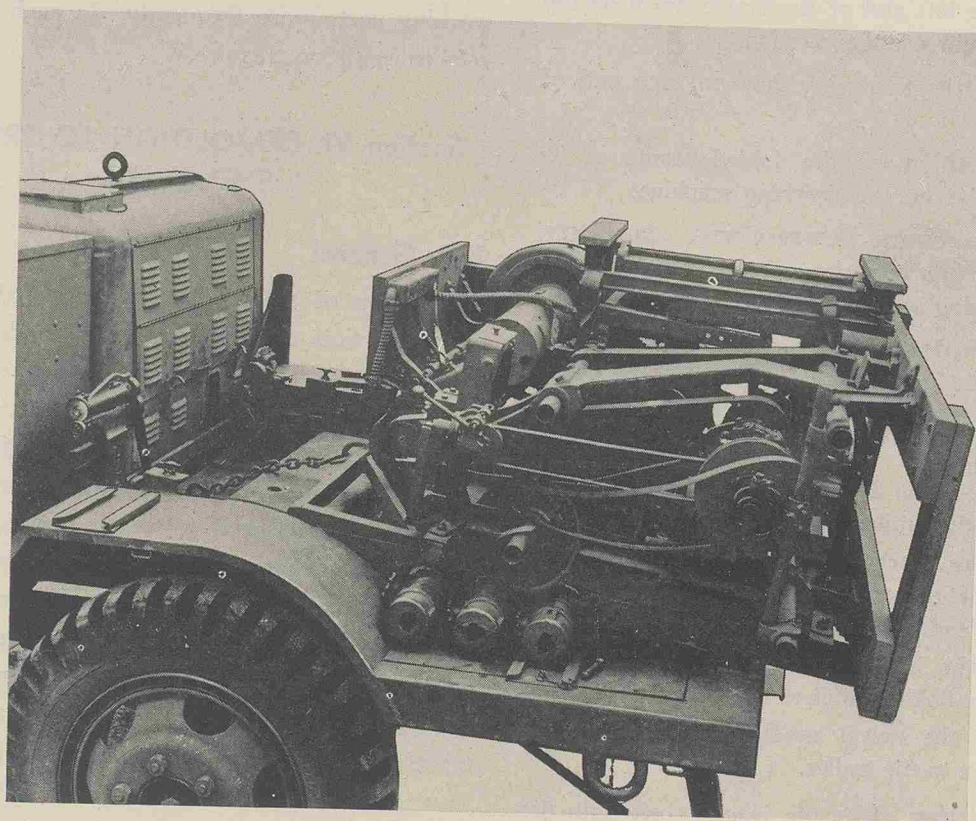


Figure 213. Loading finishing machine.

e. GENERATOR. To load the generator proceed as follows:

(1) Prepare the generator for loading as described in TM 11-940.

(2) Level the bed of the trailer as described in paragraph 239a.

(3) Place the davit in the davit housing on the trailer. See that the davit is set vertically to assure easy rotation in its housing.

(4) Attach the hook on the top of the hoist housing through the eye in the davit. Insert the hook at the end of the hoist chain into the ring welded to the top of the generator housing.

(5) Operate the hoist to raise the generator high

enough to clear its angle iron holding frame on the bed of the trailer. Slowly swing the generator into position on the frame, paying out the hoist chain as needed.

(6) Bring the turnbuckle equipped holding chain over the generator and hook the loose end into the proper steel eye on the bed of the trailer. Tighten the turnbuckle sufficiently to hold the generator securely. Do not overtighten.

(7) Place davit in carrying position on finishing machine.

f. PATCHING MACHINE. To dismantle the patching machine proceed as follows:

(1) Remove the patching machine from its bed on the table top. Remove the steel spacer.

(2) Stow the patching machine in the rigging box, bolting the machine to the floor of the box. Stow the steel spacer in the rigging box.

(3) Fold the collapsible steel frame as follows:

(a) Loosen the two wing nuts on the right end of the frame. Fold the end down on the treadle.

(b) Fold the left end of the frame down on top of the right end in a similar fashion.

(c) Tighten the two wing nuts on each end of the frame.

(d) Place and attach the folded frame in its carrying position on the finishing machine.

g. LIGHT BRACKETS, POWER CORDS, AND HOIST. Place the light brackets, power cords, hoist, and the like in the rigging box.

h. JACK HOLDERS. Place the jack holders in the special brackets on the sides of finishing machine cradle (three on the left side and three on the right).

i. STITCHER-HEAD BOX. To replace the stitcher head box on the trailer proceed as follows:

(1) Lift the stitcher-head box onto front end of the bed of the trailer, using the two handles located on the ends of the box.

(2) Slide the box over so that the positioning brackets fit the holding angles.

(3) Fasten the swivel handled bolt on the other side of the box to the trailer.

j. RIGGING BOX. Lift the rigging box onto the trailer, using the handles provided. Fasten the two catches on each end.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

242. Extreme Heat and Cold

The only preparation necessary for operation under

extreme heat and cold is the special use of lubricants. (For proper lubrication under these conditions, see paragraphs 246 through 248.)

243. Sand and Dust

Extremely sandy or dusty conditions make it necessary to inspect, clean, and lubricate the trailer working parts more frequently. In such cases proceed as conditions require.

Section VI. DEMOLITION TO PREVENT ENEMY USE

244. General

Destruction of the trailer may be expedient under certain tactical conditions in order to deny its use to the enemy. The trailer should be destroyed only on orders of higher authority. Destruction must be as complete as possible under prevailing conditions. The trailer must be so badly demolished that it cannot be restored to usable condition in the combat zone either by repair or cannibalization. The same essential parts must be destroyed on all trailers to prevent the enemy from constructing one complete operating unit from several damaged ones. During demolition all safety precautions must be taken to avoid injury to personnel.

245. Procedure

Remove fire extinguisher. Smash and cut tires, wiring, wheels, bed, towing attachments, and other component parts of the trailer, using axes, sledges, crowbars, hammers, any other available tools or rocks. Then pour gasoline over the entire trailer, including the tires. Taking adequate safety precautions, ignite the trailer.

PART THREE

MAINTENANCE INSTRUCTIONS

Section VII. LUBRICATION

246. General

Lubrication is an essential part of preventive maintenance, determining to a great extent the serviceability of parts and assemblies.

247. Lubrication Chart

a. The lubrication chart presented in figure 214 prescribes first and second echelon lubrication maintenance.

b. The service intervals specified in the lubrication chart are for normal operating conditions. Under extreme conditions, such as excessively high or low temperatures, prolonged periods of high speed, continued operation in sand or dust, immersion in water, or exposure to moisture, these operating intervals should be reduced. Failure to reduce them may result in malfunctioning or damage to the trailer. When the trailer is not in use, the intervals may be extended.

c. Lubricants are prescribed in the KEY in accordance with three temperature ranges; above 32° F., 32° F. to 0° F., and below 0° F. The time to change the grade of lubricant is determined by keeping a close check on the operation of the trailer during the approach to change-over periods. Ordinarily it will be necessary to change grades of lubricants only when air temperatures are regularly in the next higher or lower range.

248. Detailed Lubrication Instructions

a. LUBRICATION EQUIPMENT. Each trailer is supplied with lubrication equipment adequate to maintain it. Make certain this equipment is cleaned both before and after use. Operate the equipment carefully and in such manner as to insure a proper distribution of the lubricant.

b. POINTS OF APPLICATION. Lubrication fittings and oiling points are readily located by reference to the lubrication chart. (See fig. 214.) Wipe lubri-

cators and surrounding surfaces clean before applying lubricant.

c. CLEANING. Use dry-cleaning solvent or Diesel fuel oil to clean or wash all parts. Use of gasoline for this purpose is prohibited. After washing, dry all parts thoroughly before applying the lubricant.

d. COLD WEATHER LUBRICATION. (1) *General*. Cold weather affects both metals and lubricants. Extremely careful servicing, therefore, by both operating and maintenance personnel is required if functional failure is to be avoided.

(2) *Wheel bearings*. General-purpose grease No. 2, which is the regular wheel-bearing lubricant, is suitable for use in all temperatures.

(3) *Front and rear springs*. General-purpose grease No. 0 is designed for winter lubrication of vehicle chassis and is suitable for use in all temperatures below freezing.

(4) *Leveling jacks*. Engine, oil, SAE 10, may be used on the jack pawl at any temperature below freezing. The winter grade of general-purpose grease (CG No. 0) may be used for coating the threads of the jack.

e. LUBRICATION NOTES ON INDIVIDUAL PARTS. The following instructions supplement those notes on the lubrication chart which pertain to lubrication and service of individual units and parts:

(1) *Front shackle bolt*. Every month lubricate the grease fittings on the two front shackle bolts with general-purpose grease. Apply lubricant through fittings until the new grease appears.

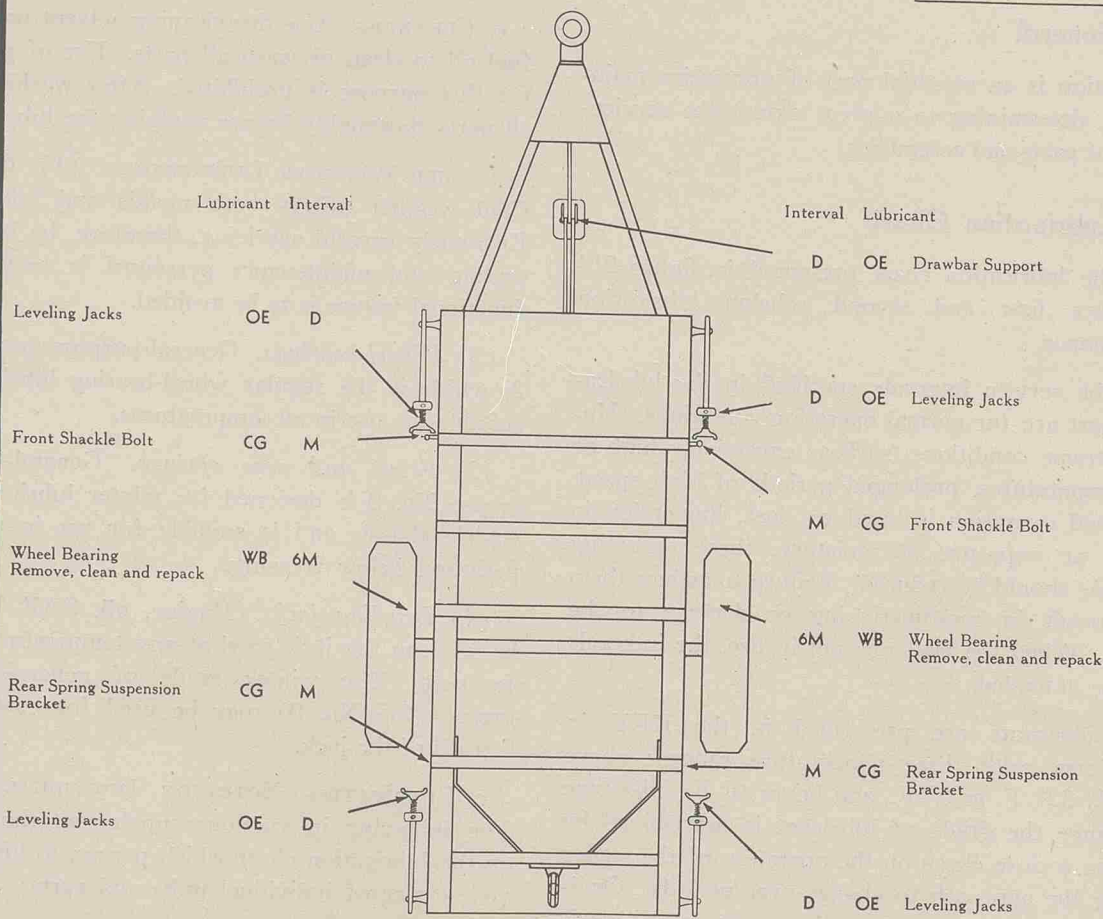
(2) *Wheel bearing*. Remove bearing cone assemblies from hub. Wash bearings, cones, spindle, and inside of hub and dry thoroughly. Do not use compressed air. Inspect bearing races and replace if damaged. Coat the spindle and inside of hub cap with general-purpose grease No. 2 to a maximum thickness of 1/16 inch only to retard rust. Lubricate bearings with general-purpose grease No. 2 with a packer or by hand, kneading lubricant into all spaces in the bearing. Use extreme care to protect the

LUBRICATION CHART

TRAILER, 2 TON, 2 WHEEL, SALVAGE REPAIR

Intervals are for normal operation. Reduce under severe operating conditions.

Clean fittings before lubricating. Wash parts with dry cleaning SOLVENT.



—KEY AND NOTES—

LUBRICANT	EXPECTED TEMPERATURES		
	Above 32° F.	32° F. to 0° F.	Below 0° F.
CG—GREASE, general purpose	CG 1	CG 0	CG 0
OE—OIL, engine	OE 30	OE 10	OE 10
ALL TEMPERATURES		INTERVALS	
WB—GREASE, general purpose, No. 2		6M... 6 Months	
		M... Monthly	
		D... Daily	

LEVELING JACKS - Every D place a light film of OE over the jack and turn-buckle threads. Place several drops of OE on the jack pawl.

Figure 214. Lubrication chart—trailer, 2-ton, 2-wheel, salvage repair.

bearings from dirt and immediately reassemble and replace wheel. Do not fill hub or hub cap. The lubricant in the bearing is sufficient to provide lubrication until the next service period. Adjust bearings.

(3) *Rear spring suspension bracket.* Every month lubricate by hand the rear suspension brackets with general-purpose grease.

(4) *Leveling jacks.* Every week clean the threads of the jack and turnbuckle and cover them with a film of engine oil. At the same time, add several drops of engine oil to the jack pawl.

f. **REPORTS AND RECORDS.** (1) A record of lubrication may be maintained on WD AGO Form 460.

(2) Report unsatisfactory performance of equipment and lubricants on WD AGO Form 468, to the Maintenance and Equipment Branch, Service Installations Division, Office of The Quartermaster General.

Section VIII. FIRST ECHELON PREVENTIVE MAINTENANCE

249. Purpose

The services set forth in this section are those performed by driver or crew before-operation, during-operation, at-halt, after-operation, and weekly. The trailer must be systematically inspected at these specified intervals each day it is operated as well as weekly to insure mechanical efficiency and to discover and correct defects before they result in serious damage or failure.

250. Scope of Services

a. Driver preventive maintenance services are listed on the back of WD Form 48, to cover vehicles of all types and models. Items peculiar to the trailer that are not listed on WD Form 48, are covered herein under the items to which they are most closely related. Items listed on the form that do not pertain to the trailer are omitted from the procedures that follow. Every organization must thoroughly school each driver in performing all the maintenance operations set forth in the succeeding paragraphs.

b. The items listed on WD Form 48 which apply to this vehicle are expanded in this section to provide detailed procedures for the accomplishment of

the necessary inspections and services. These services are arranged to facilitate inspection and conserve the time of the driver, and are not necessarily in the same numerical order as listed on WD Form 48. The item numbers, however, are identical with those shown on that form.

251. Analysis of Inspections

a. The general inspection of each item applies also to any supporting member or connection, and generally includes a check to see whether the item is in good condition, correctly assembled, secure, or excessively worn.

b. The inspection for good condition is usually a visual inspection to determine whether the unit is damaged beyond safe or serviceable limits. The term "good condition" is explained further by the following terms: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut.

c. The inspection of a unit to see that it is correctly assembled is usually a visual inspection to see whether it is in its normal assembled position in the vehicle.

d. The inspection of a unit to determine if it is secure is usually a visual examination, a hand-feel, or a pry bar check for looseness. Such an inspection should include any brackets, lockwashers, lock nuts, locking wires, or cotter pins used in assembly.

e. The term "excessively worn" will be understood to mean worn close to or beyond serviceable limits, and is likely to result in a failure if not replaced before the next scheduled inspection.

252. Report of Defects Beyond First Echelon

Any defects or unsatisfactory operating characteristics beyond the scope of first echelon to correct must be reported at the earliest opportunity to the designated person in authority.

253. Before-Operation Service

a. **GENERAL.** This inspection is designed primarily as a check to see that the vehicle has not been tampered with or sabotaged since the after-operation service was performed. Various combat conditions may have rendered the vehicle unsafe for operation. It is the duty of the driver to determine whether or not the vehicle is in condition to carry out any

mission to which it may be assigned. This operation will not be entirely omitted even in extreme tactical situations.

b. PROCEDURES. Before-operation service consists of inspecting items listed below, according to the procedure described, and correcting or reporting any deficiencies. Upon completion of the service, results should be reported promptly to the designated individual in authority.

(1) *Item 1, tampering and damage.* Look for any injury to trailer or drawbar, accessories, and equipment in general which may have resulted from tampering or sabotage, collision, falling debris, or shell fire since last parked.

(2) *Item 12, lamps and reflectors.* If tactical situation permits, turn on all switches and see that all lamps light. See that lamps and warning reflectors are secure and that lenses are clean and unbroken.

(3) *Item 13, wheel nuts.* Inspect to see that they are present, in good condition, and secure.

(4) *Item 14, tires.* Inspect tires for cuts and breaks. Remove stones wedged in treads, embedded glass, nails, or other objects from treads and carcass. Test tire pressure, and if under 55 pounds, inflate to this pressure.

(5) *Item 17, fenders.* Inspect for damage and looseness.

(6) *Item 18, towing connections.* Observe drawbar assembly to see that it is properly assembled and fastened to frame. Inspect lunette eye to see that it is in good condition for attaching to pintle. Be sure drawbar support locks securely and that safety chains are complete and well secured. Push plug of trailer wiring securely into socket on towing vehicle, if trailer is coupled to a towing vehicle.

(7) *Item 19, body, load, and tarps.* Inspect body for damage, including all mechanical devices on deck for fastening down equipment and containers. Inspect load for shifting and proper stowing. See that safety chain on finishing machine is engaged properly. Inspect canvas cover for security and damage.

254. During-Operation Service

a. GENERAL. While the trailer is in motion, listen

for any sounds such as rattles, knocks, squeals, or hums that may indicate trouble. Any time the vehicle is turned, consider this a test, and notice any unsatisfactory or unusual performance.

b. PROCEDURES. (1) *Item 25, during-operation check.* During-operation services should start immediately after the vehicle is put in motion and consist of observing items listed below and investigating any indications of serious trouble. Note all deficiencies to be corrected or reported at earliest opportunity, usually next scheduled halt.

(2) *Item 35, trailer.* Be on the alert for any abnormal performance that might be caused by a flat tire, unhitching of pintle and lunette eye, loosening of drawbar from body of trailer, shifting of load, sagging or tilting, loose canvas cover, or weaving of towed load.

255. At-Halt Service

a. GENERAL. At-halt services may be regarded as minimum maintenance procedures and should be performed under all tactical conditions.

b. PROCEDURES. At-halt services consist of investigating any deficiencies noted during operation, inspecting items listed below, according to the procedures following the items, and correcting any deficiencies found. Deficiencies not corrected should be reported promptly to the designated person in authority.

(1) *Item 39, temperatures and hubs.* Feel operating assemblies for abnormal temperatures. A hot hub indicates a damaged, improperly adjusted, or inadequately lubricated wheel bearing.

(2) *Item 42, springs and suspensions.* Observe springs for broken or shifted leaves; the latter condition indicates broken spring bolt or rebound clips. Inspect U-bolts and shackle bolts for tightness and damage.

(3) *Item 44, wheel nuts.* Inspect wheels and rims to see that they are not damaged. Inspect nuts attaching wheels to hubs to see that all are present and secure.

(4) *Item 45, tires.* Examine tires for damage and under-inflation, and remove embedded stones and other objects from treads and tire body.

(5) *Item 49, fenders.* Inspect fenders for damage and looseness.

(6) *Item 50, towing connections.* Inspect drawbar assembly to see that it is properly fastened to the frame. Inspect lunette eye to see that it is in good condition for attaching to the pintle. Be sure drawbar support locks securely in towing position and is kept in this position by locking device. Inspect safety chains to see that they are complete and secured to both trailer and towing vehicle. Push plug of trailer wiring securely into socket of towing vehicle.

(7) *Item 51, body, load, and tarps.* Inspect body for damage, load for shifting and proper stowing, and canvas cover for damage and correct fastening.

256. After-Operation and Weekly Service

a. GENERAL. After-operation servicing is particularly important, because at this time, the driver inspects the trailer to detect any deficiencies which may have developed and corrects those he is permitted to handle. He should report promptly to the designated person in authority the results of his inspection. If this service is performed thoroughly, the trailer should be ready to roll again on a moment's notice. The before-operation service, with a few exceptions, is then necessary only to ascertain whether the vehicle is in the same condition in which it was left upon completion of the after-operation service. The after-operation service should never be entirely omitted even in extreme tactical situations, but may be reduced to the bare fundamental services outlined for the at-halt service, if necessary.

b. PROCEDURES. When performing the after-operation service the driver must remember any irregularities noticed during the day in the before-operation, during-operation, and at-halt services. The after-operation service consists of inspecting and servicing the items listed in (1) to (10) below. Those items of the after-operation service which are marked by an asterisk (*) require additional weekly services, the procedures for which are indicated in (3), (4), (6), (8), (9) and (10) below for each applicable item.

(1) *Item 59, lamps and reflectors.* Test all lights, if the tactical situation permits. Clean lenses and warning reflectors, and examine for damage and security of mountings.

(2) *Item 64, electrical wiring.* Inspect wiring for breaks, broken insulation or bare wire, looseness of fastening on the frame, and good connections at

junction block and switch. Inspect switch to see that it is in good condition, operating satisfactorily, and secure.

(3) *Item 68, *tires.* (a) *Daily.* Inspect tires for cuts or breaks. Remove stones, glass, nails, or other objects embedded in treads or carcass. Test tire pressures, and if under 55 pounds, inflate to this pressure. If tire is warm, pressure may exceed 55 pounds. After tire is cool, recheck pressure before releasing any air from the tire.

(b) *Weekly.* Replace damaged or excessively worn tires.

(4) *Item 69, *springs and suspensions.* (a) *Daily.* Inspect the springs for broken or shifted leaves; the latter condition indicates broken or missing spring bolts. Inspect U-bolts for tightness; inspect shackle bolts for tightness, both at springs and frame.

(b) *Weekly.* Tighten all loose nuts and bolts.

(5) *Item 76, fenders.* Inspect fenders for damage and looseness of fastening to body. Tighten attaching nuts and bolts if they are loose.

(6) *Item 77, *towing connections.* (a) *Daily.* Inspect drawbar assembly and see that it is properly fastened to frame and in good condition. Inspect lunette eye to see that it is in good condition for attaching to pintle. Be sure drawbar support locks in parking position and in towing position, and is held securely in latter position by locking device. Inspect safety chains to see that they are complete and secure. Push plug of trailer wiring securely into socket on towing vehicle.

(b) *Weekly.* Tighten assembly and mounting bolts, and lubricate as necessary.

(7) *Item 78, body, load, and tarps.* Examine body for damage, including all mechanical devices on deck for fastening down equipment and containers. Inspect tarp for proper number of hold-down attachments and for rips, tears, or other damage. If trailer is loaded, see that load is properly stowed.

(8) *Item 82, *tighten wheel, rim, and spring U-bolt nuts.* (a) *Daily.* Tighten all wheel, rim, and spring U-bolt nuts, replacing any nuts which may be missing.

(b) *Weekly.* Tighten all units where inspection or experience indicates the need on a weekly basis.

(9) Item 83, *lubricate as needed. (a) Daily. Lubricate all points where inspection of the vehicle indicates the necessity.

(b) Weekly. Lubricate the vehicle as indicated on the lubrication chart (fig. 214), or as experience and inspection indicate the need on a weekly basis.

(10) Item 84, *clean trailer. (a) Daily. Clean the trailer and remove excess dirt and grease from exterior and running gear.

(b) Weekly. Wash vehicle and remove all dirt and grease. If washing is impractical, wipe as clean as possible.

Section IX. SECOND ECHELON PREVENTIVE MAINTENANCE

257. General

Regular preventive maintenance inspections and services are a function of the using unit and a responsibility of the commander thereof. The frequency of the services outlined herein is considered a minimum requirement for normal operation of vehicles. Under unusual operating conditions, such as extreme temperatures and dusty or sandy terrain, it may be necessary to perform certain services more frequently.

258. First Echelon Participation

The operator should accompany the trailer and assist the mechanics during periodic second echelon preventive maintenance operations. Ordinarily, the operator should present the trailer for a scheduled service in a reasonably clean condition; that is, it should be dry and not caked with mud or grease to an extent that would hamper inspection and servicing. However, the trailer should not have been washed or wiped thoroughly clean, since certain types of defects, such as cracks, leaks, and loose or shifted parts or assemblies, are more apparent if the surfaces are slightly soiled or dusty.

259. General Procedures

The general procedures are basic instructions which are to be followed when performing the services on the items listed in paragraph 260.

a. When new or overhauled subassemblies are installed to correct deficiencies, care should be taken

to see that they are clean, correctly installed, and properly lubricated and adjusted.

b. When a new lubricant retainer seal is being installed, a coating of lubricant should be spread over the sealing surface of the lip of the seal. If the new seal is of leather, it should be soaked in SAE No. 10 engine oil (warm, if practical) for at least 30 minutes; then the leather lip should be worked carefully by hand before the seal is installed. The lip must not be scratched or marred.

c. The general inspection of each item applies also to any supporting member or connection and usually includes a check to see whether the item is excessively worn or in good condition, correctly assembled, and secure. The mechanics must be thoroughly trained in the following:

(1) The term "excessively worn" means that a unit is worn close to or beyond serviceable limits. A unit excessively worn is likely to result in a failure if not replaced before the next scheduled inspection.

(2) The term "good condition" means that a unit is not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut. The inspection for good condition is usually a visual inspection to determine whether the unit is damaged beyond safe or serviceable limits.

(3) The term "correctly assembled" means that a unit is in its normal assembled position in the vehicle. The inspection of a unit to see that it is correctly assembled is usually a visual inspection.

(4) The term "secure" means that brackets, lock-washers, lock nuts, locking wires, cotter pins, or any other unit of the assembly are properly adjusted. The inspection of a unit to determine whether it is secure is usually a visual examination, a hand-feel, or a pry bar check for looseness.

d. Special services are indicated by repetition of the item numbers in the columns which show the interval at which services are to be performed. For example, an item number in one or both columns opposite a "tighten" procedure means that the actual tightening of the object must be performed. The special services include:

(1) *Adjusting.* Make all necessary adjustments in accordance with pertinent directives.

(2) *Cleaning.* Clean units of the vehicle with Diesel fuel or dry-cleaning solvent to remove excess lubricant, dirt, and other foreign material. After the parts are cleaned, rinse them in clean dry-cleaning solvent and dry them thoroughly. Take care to keep the parts clean until reassembled, and be certain to keep cleaning fluid away from rubber or other material which it will damage. Clean the protective grease coating from new parts, since this material is not a good lubricant.

(3) *Serving.* Serving usually consists of performing special operations, such as replenishing battery water, draining and refilling units with oil, and changing the oil filter cartridge.

(4) *Tightening.* All tightening operations should be performed with sufficient wrench torque (force on the wrench handle) to be effective and according to good mechanical practice. Use torque-indicating wrench where specified. Do not overtighten, as this may strip threads or cause distortion. Tightening will always be understood to include the correct installation of lockwashers, lock nuts, and cotter pins provided to secure the tightening.

e. When it is impracticable to perform the complete preventive maintenance operations at one time, they can sometimes be handled in sections, but they should all be completed within the week, if possible. All available time at halts and in bivouac areas must be utilized, if necessary, to assure that maintenance operations are completed. When limited by the tactical situation, items indicated for special services should be given first consideration.

260. Specific Procedures

a. The numbers of the preventive maintenance procedures which follow are identical with those outlined on WD AGO Form 461. Certain items on the work sheet that do not apply to the trailer are not included herein. In general, the numerical sequence of items on the work sheet is used in the following procedures, but in some instances there is deviation for conservation of the mechanic's time and effort.

b. The procedures for performing second echelon preventive maintenance follow. Perform each service monthly, except (2)(b) and (14)(b) below which need be performed only once every 6 months.

(1) *Item 47, tires and rims.* (a) *Valve stems*

and caps. Examine to see that all stems are in good condition and in correct position and that all valve caps are present and installed securely. Do not tighten with pliers.

(b) *Condition.* Inspect all tires for cuts, bruises, breaks, and blisters. Remove embedded glass, nails, and stones. Examine for irregular tread wear, watching for any sign of flat spots, cupping, feathered edges, and one-sided wear. All tires with cuts or injuries extending to or into the cord body and those worn smooth in the center of the tread must be replaced. Any mechanical deficiencies causing such conditions should be determined and corrected or reported. The wheel positions of tires with irregular wear should be changed to even up the wear.

(c) *Direction.* Directional tires and non-directional tires should not be installed on same vehicle. Directional tires on all trailer wheels will ordinarily be mounted so that the point of the "V" of the tread "chevrons" will point up when viewed from front.

(d) *Rims.* Inspect to see that all rims and their lock rings and flanges are in good condition and secure.

(e) *Tighten.* Tighten all wheel stud nuts securely.

(2) *Item 52, wheels.* (a) *Inspect.* Inspect to see that wheels are in good condition. Revolve them and observe whether they have excessive run-out. Without removing wheels, examine for evidences of looseness in wheel bearing adjustment. Adjust as required by tightening nut until slight drag is felt when revolving wheel. Back off one-third turn and test for excessive play or looseness by prying wheel up and down with a bar. Revolve wheel and listen for any indication of dry or damaged wheel bearings. Examine for lubricant leaks.

(b) *Serve.* Disassemble bearing and oil seals. Clean thoroughly and check rollers, balls, races, and cages to see that they are in good condition and that cups are secure. If bearings must be replaced, new cups should be installed. See whether machined surfaces upon which bearings are assembled are in good condition. Lubricate.

(3) *Item 56, springs.* Inspect to see that all items of the springs are in good condition, correctly assembled and secure. Spring clips and bolts should be in place; spring leaves should not be shifted out of their correct position. This may be an indication of a sheared center bolt. Examine to see that the

deflection of both springs is normal and approximately the same. Inspect hangers and bolts for excessive wear by means of a pry bar. Tighten all spring U-bolts securely and uniformly. Check position of shackle and tighten shackle nut securely.

(4) *Item 128, axle.* Examine to see whether it is sprung or bent, and that the attachments are secure.

(5) *Item 79, body mountings.* Inspect to see that mountings are all in good condition and secure.

(6) *Item 80, frame.* Inspect brackets, side rails, cross members, and other parts of the frame to see that they are in good condition, secure, and correctly aligned.

(7) *Item 81, wiring, conduits, and grommets.* Inspect these items underneath the vehicle to see that they are in good condition, properly supported, and connected and secure.

(8) *Item 91, lamps.* Inspect to see that the switch for the tail, stop, and black-out lamps operates properly and that with switch on, all lights light properly; see whether any lamps remain on with switch off. Inspect all lamps to see that they are in good condition and secure; examine for dirty and broken lenses.

(9) *Item 92, safety reflectors.* See that reflectors are all present, in good condition, and clean and secure.

(10) *Item 125, electric connections.* See that connections are in good condition and clean and secure.

(11) *Item 99, fenders.* See that wheel housings are in good condition and secure.

(12) *Item 100, body.* Inspect to see that chains, floor, sockets, and tarpaulins are in good condition and secure. See that tarpaulin and fasteners or ropes, grommets, and metal hooks or loops on the body are all present, in good condition, and secure and that equipment retaining devices and latches are adequately lubricated.

(13) *Item 103, paint and markings.* Inspect paint of entire vehicle to see that it is in good condition, paying particular attention to any bright spots in finish that might cause glare or reflection. Inspect vehicle markings and identification for legibility. Include identification plates and their mountings, if furnished.

(14) *Item 127, landing gear.* (a) *Inspect.* In-

spect to see that drawbar and support are in good condition, correctly assembled, secure, and adequately lubricated, and that support locks securely in towing and parking positions. Lubricate as needed.

(b) *Tighten.* Tighten all landing gear assembly and mounting bolts.

(15) *Item 124, tow hitch.* (a) *Inspect.* Inspect towing lunette to see that it is in good condition and secure to drawbar.

(b) *Tighten.* Tighten all mountings and assembly bolts securely.

(16) *Item 126, safety devices.* Inspect chains and other parts of safety devices to see that they are in good condition and securely connected to trailer drawbar.

Section X. TROUBLE SHOOTING

261. General

This section contains trouble-shooting information which can be of help in determining and removing the causes of trouble that may develop in the trailer. Paragraph 262 lists the principal symptoms of trouble, suggests possible causes, and prescribes appropriate remedies.

262. Causes and Remedies for Trailer Troubles

Symptom	Possible cause	Remedy
Body misalignment.	Loose spring and shackle bolts.	Tighten bolts in spring shackles and hangers.
Drawbar misaligned.	Rails bent. Rails loose.	Service or replace. Tighten all loose bolts.
Trailer weaves.	Axle nut loose. Wheel bearings out of adjustment. Spring assembly loose. Axle bent.	Tighten and adjust wheel bearings. Adjust. Tighten all bolts. Replace axle.
Noisy springs.	Loose spring mounting bolts. Spring shackles dry. Broken spring leaf. Springs out of line.	Tighten or replace. Lubricate spring shackle. Replace spring. Check and tighten the bolt and hanger assemblies.
	Center bolt loose.	Tighten center bolt nut.
	Clip bolts loose.	Tighten clip bolt nuts.

Symptom	Possible cause	Remedy
Wobbly wheel.	Tie bolts loose.	Tighten tie bolt nuts.
	Center bolt sheared.	Remove spring and replace.
	Worn bolts in shackles.	Replace.
	Worn bushing in shackles.	Replace shackle complete.
Scuffed tires.	Loose studs.	Tighten or replace.
	Improper bearing adjustment.	Adjust.
	Damaged bearings.	Replace.
Air leakage.	Under-inflation.	Inflate to correct pressure: 55 pounds.
	Bent axle.	Replace.
No lights.	Valve cap missing.	Install new cap.
	Valve cap seal broken.	Replace valve cap.
	Valve core loose or damaged.	Tighten or replace core.
	Torn or punctured inner tube.	Repair tube; replace if necessary.
Lights flicker.	Dead battery in towing vehicle.	Replace battery.
	Open or short circuit.	Locate and repair. (See figs. 215 and 216.)
	Burned out lamps.	Replace sealed lamp unit. If caused by a short, locate and repair.
Lights dim.	Defective switch.	Replace.
	Loose wire connections or intermittent ground.	Check wires and insulation; repair and tighten. Replace if necessary.
Lights dim.	Weak battery in towing vehicle.	Test battery; replace if necessary.

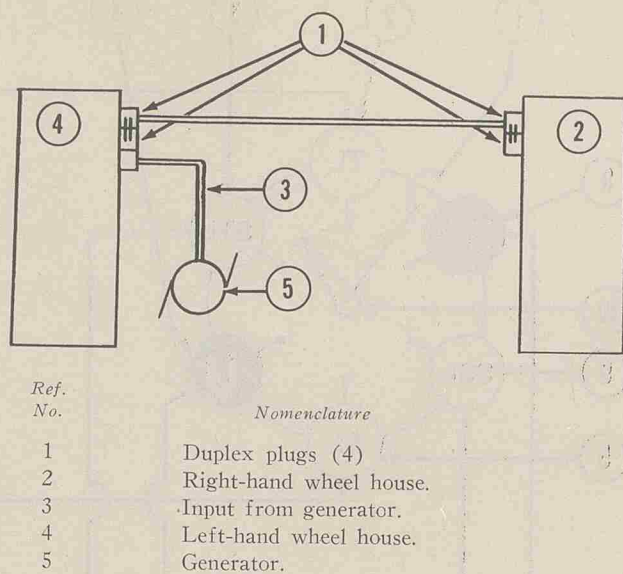
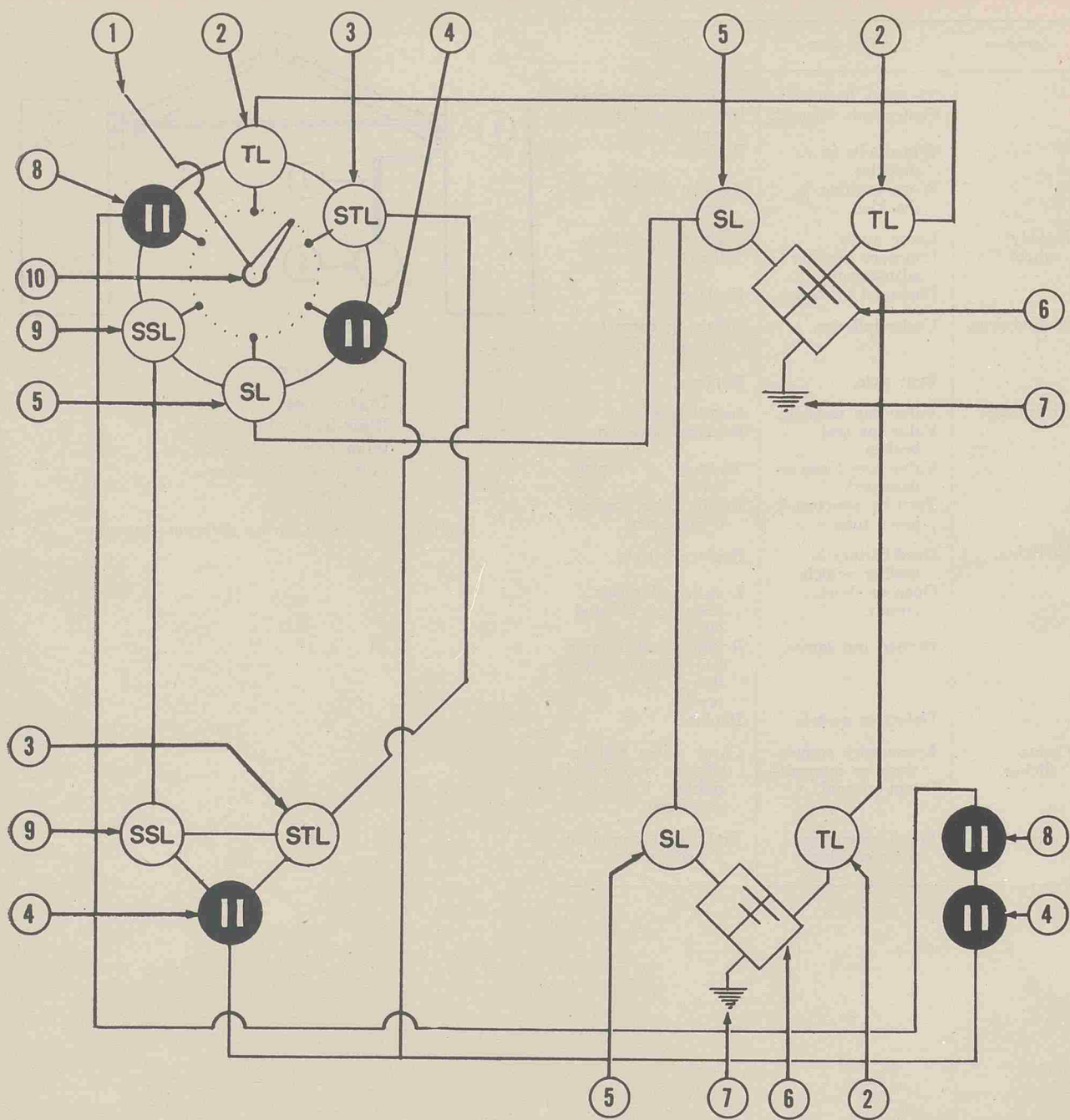


Figure 215. Power wiring diagram—top view.



Ref. No.	Nomenclature
1	Lead from towing vehicle.
2	Tail light.
3	Service tail light.
4	Blackout tail light.
5	Stoplight.
6	Socket.
7	Ground.
8	Blackout stoplight.
9	Service stoplight.
10	Switch.

Figure 216. Lighting wiring diagram—trailer rear view.

PART FOUR

AUXILIARY EQUIPMENT

(The components of the trailer chassis are integral parts of the vehicle. As such they are described in the first three parts of this manual. Therefore, part four does not apply to the trailer.)

PART FIVE

REPAIR INSTRUCTIONS

(For information on third and higher echelon maintenance of the trailer, see similar instructions in TM 9-883.)

APPENDIX I

STITCHING MACHINE

1. Storage

To prepare the stitching machine for storage, remove all belts. Cover all unpainted working parts with a rust preventive, such as slushing grease or oil. If a waterproof bag of sufficient size is available, slide the open end of the bag over the top of the stitcher and tie it at the bottom of the machine below the countershaft. If a waterproof bag is not available, wrap the stitcher head and countershaft with moisture-resistant paper and tie the wrapping securely. Belts should be coiled and stored where they will remain clean and dry. When the stitcher has been properly prepared for storage, its working parts will be well protected from dirt and moisture.

2. Shipment

a. PREPARATION FOR SHIPMENT. If the stitcher is to be shipped crated, it should be protected in the same manner as for storage. (See par. 1 this app.) If the stitcher is to be shipped boxed, its working parts should still be covered with a rust preventive before it is packaged for shipment, but not encased in the waterproof bag.

b. PACKAGING. (1) *Constructing base of crate.* Lay down two soft wood stringers each 2 by 6 by 32 inches. Space them 24½ inches apart at both ends. Across them at right angles lay two stringers, each 2 by 6 by 36½ inches, and one stringer 2 by 4 by 36½ inches. The 2- by 4-inch stringer is placed flush with the ends of the two bottom stringers. One 2- by 6-inch stringer is placed next to and inside of the 2- by 4-inch cross stringer. The other 2- by 6-inch stringer is placed on the opposite ends of the two bottom stringers, so that its corners are flush with the corners of the bottom stringers. The cross stringers are nailed to the bottom stringers with coated sixteenpenny nails. This operation forms a base 36½ inches wide and 32 inches long. The end of the base which contains the 2- by 4-inch and 2- by 6-inch cross stringers is used as the front of the base, and the front of the stand of the machine is bolted to it.

(2) *Securing stitcher to base of crate.* Bolt each

leg of the stand of the stitcher to the base of the crate with a ¾- by 4½-inch carriage bolt.

(3) *Completing crate frame.* Set an upright 2 by 4 by 58 inches at each corner of the base, and secure each upright with coated sixteenpenny nails. On the inside of the frame, place one diagonal stringer on each of the four sides of the frame. Run each stringer from one upright at the base to the adjacent upright on the same side of the frame, so that the top end of each diagonal stringer is fastened to the upright at about the level of the cam posts of the stitcher. Starting at the base of the frame, on the outside, nail 1- by 6- by 32-inch horizontal stringers on the sides of the frame. Use coated nails of about an eightpenny weight. Leave approximately 6 inches between stringers on the sides of the crate. On the outside of the front and rear of the frame, nail a 1- by 6- by 38½-inch horizontal stringer at about the level of the cam posts of the stitcher. Space additional stringers down to the base of the crate, leaving about 6 inches between boards.

(4) *Bracing stitcher.* Place a 1- by 6- by 32-inch piece of lumber on edge and pass it into the crate from front to rear, across the cam posts of the stitcher. When this cross member is correctly positioned between the front and rear of the crate, mark the location of the cam post on the lower edge of the cross member. Withdraw cross member from crate and at the point which has been marked cut a notch that will engage the cam post. Using another piece of lumber the same size, repeat this process on the other cam post. Place these two cross members over the cam posts to serve as braces, and nail them securely to the uppermost stringer at the front and rear of the crate.

(5) *Finishing crate.* Nail 1- by 6- by 38½-inch cross stringers, one above the other, from the level of the cam post braces to the top of the crate frame. Nail 1- by 6- by 34-inch stringers from front to rear across the top of the frame. Leave about 3 inches between stringers.

3. References

a. LANDIS NO. 12 MODEL K. See the manufac-

turer's manual: Landis No. 12 Model K Stitcher, Instruction Book and Parts Catalog.*

b. LANDIS No. 12 MODEL F. See the manufacturer's manual: Landis No. 12 Model F Stitcher, Instruction Book and Parts Catalog.*

c. AMERICAN MODELS B, C, AND CA. See the manufacturer's manual: Instruction Book and Price List of Parts, American Models B, C, and CA Curved Needle Stitchers.*

*Not a War Department publication and cannot be requisitioned from Adjutant General depots.

APPENDIX II

FINISHING MACHINE

1. Storage

a. GENERAL. When a finishing machine is to be stored for an extended length of time, it should be protected from dirt and moisture.

b. PROCEDURES. Remove belts, coil them, and store them where they will be kept clean and dry. Cover the motor with a moisture-resistant paper bag. All working metal parts of the machine not protected by paint should be coated with a rust preventive such as slushing grease or slushing oil.

2. Shipment

a. GENERAL. When the finishing machine is to be shipped, it should first be crated and then transported by an enclosed carrier. Before the machine is crated, it should be protected from dirt and moisture as described in paragraph 1*b*, this appendix. The crate should be designed to protect the machine from damage in handling during loading, transporting, and unloading.

b. CRATING. For the longitudinal members of the base (skid) of the crate use two 2- by 4-inch soft wood stringers which are long enough to extend just beyond each end of the machine. Space them so that all legs of the machine frame will rest on them. Nail 2- by 4-inch cross stringers across top of each end of the two longitudinal members. Space additional cross stringers so that they will be between each pair of legs of the frame when the machine is placed on skid of crate. Place machine on the skid, anchor

foot of each leg to the skid with 3½-inch carriage bolts (head of bolt at bottom of the skid). Emplace at each corner of the skid a 2- by 4-inch upright just long enough to clear the topmost point of the machine. Nail four evenly spaced 1- by 6-inch horizontal stringers to the outside of the corner uprights of the crate frame to form the two sides and the two ends of the crate. Slide two 2- by 6-inch pieces, measuring the inside width of the crate, through the machine between the upper frame pipes and the blower pipe of the machine. Mark on each piece the location of the two frame pipes and cut 2-inch notches at the marked points in one edge of the two pieces. Place pieces in position on upper frame pipes of the machine so that notches in the pieces engage both frame pipes. Nail both pieces to both sides of the crate. Nail a diagonal cross stringer on inside of each side and each end of crate, holding the cross stringers on inside of crate and nailing from outside. Nail two 1- by 6-inch stringers across the length of the top of the crate to enclose the machine.

3. References

a. War Department Catalogs QM 7 and QM 8.

b. See the manufacturer's manual: Landis Finisher, Parts Catalog, 100 Line and 200 Line.*

c. See the manufacturer's manual: American Finishing Machines, Instruction Book.*

*Not a War Department publication and cannot be requisitioned from Adjutant General depots.

APPENDIX III

SOLE CUTTER AND SKIVER

1. Storage

When cutter and skiver machines are to be stored for an extended length of time, they should be protected from dirt and moisture. All working parts of the machines not protected by paint should be covered with some rust preventive. Normally grease or heavy oil is adequate.

2. Shipment

a. GENERAL. When cutter and skiver machines are to be shipped, they should first be prepared as described in paragraph 1 of this appendix, and then boxed.

b. PROCEDURE. Loosen setscrew in the hand crank and remove the hand crank from the driving shaft. Construct a five-sided box to clear outside dimensions of the machine by 1 inch on each side. Place

machine in the box with the rear to the bottom of the box. Place the crank handle in the box alongside of the base of the machine frame. Place a wooden cleat between the upper and lower cutter arms and nail the cleat to the bottom of the box. Place wooden cleat above upper cutter arm and nail cleat to bottom of box. Place wooden cleat below lower cutter arm and nail cleat to bottom of box. Place wooden cleat on each side of the stand of the machine frame and nail each cleat to the bottom of the box. Use as braces two pieces of wood measuring the inside length of the box. Place braces upon the front of the machine as it rests in the box. With wooden cleats secure both ends of each brace to ends of the box. Complete by closing top of box.

3. References

War Department Catalogs QM 7 and QM 8.

APPENDIX IV

PATCHING MACHINE

1. Storage

When the patching machine is to be stored for an extended period, it should be protected against dirt and moisture. Remove the belt, coil it, and store it in a clean, dry place. Remove the needle and bobbin from the machine. All the bobbins (including spares) should be covered with oil, grease, or some other rust-preventive material, wrapped in paper, and stored in the tool drawer of the machine. All needles should be sealed in the paper envelopes in which they are shipped. Under normal storage conditions, the packaged needles may be stored in the tool drawer of the machine. Cover the unpainted parts of the machine (including the shuttle and shuttle race) with oil, grease, or some other rust-preventive material. Slip a moisture-resistant paper bag over the machine head and tie the bag at its base beneath the lower arm of the machine.

2. Shipment

a. PREPARATION FOR SHIPMENT. When the machine is to be shipped within the zone of the interior, it will be prepared for shipment as in paragraph 1 of this appendix, except that the paper bag will not be placed over the machine head. When the machine is to be shipped overseas, it will be prepared for shipment as in paragraph 1 of this appendix, with the following exceptions:

(1) The rust preventive used will conform to current War Department specifications.

(2) The machine will be wrapped securely with a grade C wrapper suitably sealed.

b. PACKING. (1) *Shipment in zone of the interior.* Box the machine with lumber at least $\frac{5}{8}$ inch thick. When boxed in its original shipment case, pack the machine as follows:

- (a) Remove balance wheel retaining screw.
- (b) Remove the balance wheel.
- (c) Replace balance wheel retaining screw.
- (d) Remove thumbscrews in lower left-hand corner of the machine box.
- (e) Remove metal machine securing bar.

(f) Remove the machine stand screws.

(g) Put the machine head in the lower left-hand corner of the machine box.

(h) Fasten the machine securing bar in position.

(i) Replace and tighten the thumbscrews in the lower left-hand corner of the machine box.

(j) Place the balance wheel on the side wall in the inside of the box and secure it in position.

(k) Take the machine belt off the stand.

(l) Replace the front panel.

(m) Swing top panel down and over to form the top panel of the box.

(n) Replace and tighten the panel connecting screw.

(2) *Oversea shipment.* (a) The lumber used in construction of the box should be at least $\frac{5}{8}$ inch thick.

(b) The box will be supplied with suitable internal bracing and blocking nailed inside to insure against damage in handling and shipment. Care should be taken in the blocking and bracing to insure against undue strain or pressure on fragile or sensitive parts of the machine. Suitable cushioning material, such as cellulose or felt padding, should be placed between the bracing and the machine to cushion against shock and to prevent rupture of the waterproof wrapping.

(c) All nails which are not clinched should be cement coated.

(d) The box containing the machine is then packed with the stand in a nailed wooden box, style 2, 2½, 3, or 4. The box should conform to current specifications. The metal stand and the wooden box containing the machine should be adequately braced and blocked inside the outer wooden box to insure against damage in handling or shipment.

(e) The lumber used in the outer wooden box should be at least $\frac{3}{4}$ inch thick.

(f) The boxes described above should be strapped with two steel straps protected with a rust-resistant coating. The straps should be applied approximately

APPENDIX V

TWO-WHEEL SHOE REPAIR TRAILER

1. Storage and Shipment

Certain precautions and procedures must be observed when shipping or storing the trailer. See appendixes I to IV inclusive, for specific shipping and storing information on the shoe repair equipment carried on the trailer. Consult AR 850-15 for regulations on vehicle storage and shipment. General principles of loading and blocking for rail shipment may be obtained from the Technical Manual on the towing vehicle. The current War Department packing specification on the trailer, two-wheel, repair prescribes the procedure for crating and marking the trailer which the contractor must follow when shipping new units from the factory.

2. References

a. INDEXES. Consult the following indexes for changes to, or revisions of, the publications listed below, as well as for new publications relative to the trailer:

- (1) FM 21-6, List and Index of War Department Publications.
- (2) FM 21-7, List of War Department Films, Film Strips and Recognition Film Slides.
- (3) War Department Catalog, ORD 2, Index.

b. EXPLANATORY PUBLICATIONS. (1) *Fundamental principles.*

- (a) TM 1-455, Electrical Fundamentals.
- (b) TM 9-883, 1-Ton (2-Wheel Cargo and Water Trailers).
- (c) TM 10-450, Sheet Metal Work, Body, Fender, and Radiator Repairs.

(d) TM 10-560, Chassis, Body, and Trailer Units.

- (e) TM 10-580, Automotive Electricity.
- (f) TM 21-300, Driver Selection and Training.
- (g) TM 21-305, Driver's Manual.
- (h) TM 37-250, Basic Maintenance Manual.
- (i) AR 850-10, Registration of Motor Vehicles.
- (j) AR 850-15, Motor Vehicles.
- (k) AR 850-20, Precautions in Handling Gasoline.

(2) *Maintenance and repair.*

(a) TM 9-850, Cleaning, Preserving, Sealing, Lubricating and Related Materials Issued for Ordnance Materiel.

(b) Maintenance and Care of Pneumatic Tires and Rubber Treads.

(c) TM 37-265, Instruction Guide—Care and Maintenance of Ball and Roller Bearings.

(d) TM 37-2810, Motor Vehicle Inspection and Preventive Maintenance Services.

(3) *Protection of materiel.*

- (a) FM 5-20, Camouflage, Basic Principles.
- (b) FM 5-20B, Camouflage of Vehicles.
- (c) FM 5-25, Explosives and Demolitions.
- (d) FM 17-59, Decontamination of Armored Force Vehicles.
- (e) FM 21-40, Defense Against Chemical Attack.
- (f) TM 3-220, Decontamination.

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